cycles

—A MONTHLY REPORT

June 1952

FOUNDATION FOR THE STUDY OF CYCLES
New York, New York

CONTENTS

Page

THE DIRECTOR'S LETTER 195

RESEARCH

A Stock Market Forecast Made in 1912 197
The 142-Year Cycle in War 201
Is There a 17 1/3-Year Pattern in Stocks? 205
Possible Cycles in Pig Iron Prices, 1784 - 1951 207

HOW HAS IT WORKED OUT?

The 57-Year Cycle in International Conflict 210
The 33-Month Cycle in Residential Building Construction . . . 211

TECHNICAL

Techniques Involved in the January 1952 Article Entitled "The 37-Year Cycle in the Frequency of Chinese Earthquakes" 212

LETTERS 220

QUESTIONS & ANSWERS 224

ADDITIONS TO THE LIBRARY 226

THE FOUNDATION FOR THE STUDY OF CYCLES

The Committee of the Foundation consists of the following scientists and administrators:

UNITED STATES OF AMERICA

Copley Amory, Chairman Emeritus

Charles Greeley Abbot
Research Associate
Smithsonian Institution

Harold Elmer Anthony
Chairman and Curator
Department of Mammals
American Museum of Natural History

George Baekeland, Chairman of the Committee of the Foundation
The Bakelite Corporation

Harold Gardiner Bowen
Vice Admiral, U.S. Navy, Retired
Executive Director, Thomas Alva Edison Foundation

Verne Burnett
Partner
Verne Burnett Associates

Hon. W. Cameron Forbes
Member, Board of Trustees
Carnegie Institution of Washington;
Life Member of the Corporation,
Massachusetts Institute of Technology

Webster N. Jones
Dean, College of Engineering and Science
Carnegie Institute of Technology

Daniel Trembly MacDougal
Former Director
Department of Botanical Research and Laboratory of Plant Physiology
Carnegie Institution of Washington

CANADA

Hon. Charles Camsell
Former Commissioner
Northwest Territories

Frank Cyril James
Principal and Vice-Chancellor
McGill University

GREAT BRITAIN

Sir Patrick Ashley Cooper
Governor
Hudson's Bay Company

Julian Sorrell Huxley
Former Director General
United Nations Educational, Scientific and Cultural Organizations

---

CYCLES — A Monthly Report is published by the Foundation for the Study of Cycles every month except during July and August at the Foundation's offices at 9 East 77th Street, New York 21, N. Y. Subscription rates $10.00 a year. Entered as second class matter at the Post Office at New York, N. Y. Letters for the personal attention of the Director should be sent to East Brady, Pennsylvania.

cycles

—a monthly report

The Official Bulletin of the Foundation for the Study of Cycles

VOLUME III NUMBER 6 JUNE 1952

The Director's Letter

Dear Member:

Through the generosity of a friend money is now available to send the **Journal of Cycle Research**, without charge, to all important college libraries here and abroad. By the time this letter reaches you 1,200 libraries will have received their first copy.

From the same source money is available to enlarge our scientific membership so that it will include all cycle students in all branches of natural and social science in every part of the world.

Finally, from another friend, money is available to support a student (for a period of three years, if all goes well) for full time study of cycles, here at Foundation research headquarters.

To evaluate the significance of these advances it may be well to spend a moment to go back to fundamentals.

The Foundation for the Study of Cycles was created to act as a clearinghouse among scientists so that cycle students in one field could learn of the techniques used and the results achieved by cycle students in other fields.

Coordination Needed

Such coordination is badly needed. Biologists who study cycles think of themselves first and foremost as biologists; economists who study cycles think of themselves first and foremost as economists; and so on for each of the 36 disciplines in which rhythmic cycles are found. Yet, all of these workers are concerned with different aspects of cycles; each has something to offer to all the others.

If the science of cycles is ever to achieve its full stature it must break down these artificial barriers and teach the cycle student in medicine, for instance, that in addition to being a doctor he also has something in common with the economist or the astrophysicist or the geologist who is studying cycles in some separate branch of knowledge. By means of a clearinghouse we must exchange information in regard to techniques and results. We must gradually create a consciousness of common interest on the part of workers in separate fields. At the present time such workers are too often concerned exclusively with their own little corner of things and have no appreciation for or interest in anything except the work that they themselves are conducting.

Hard to Find Cycle Students

It is not as easy to ferret out cycle workers as you might suppose. Before I knew better I used to think that one could go to the central administrative offices of a university and discover the names of the professors who were studying one aspect or another of cycles. I was soon set straight. In many colleges and universities none of the administrative officers has any idea of the research projects of the professors. Even heads of departments often do not know the research projects of the professors who are nominally under their direction. Such lack of centralized control or even centralized information is shocking to a person with a background in industry, but I do not suppose there is anything that can be done about it.

The Directory

The Foundation however has been constantly alert to the needs of coordination from the very beginning. The first step toward the fulfillment of our basic objective of clearinghouse was taken in 1940. In that year we published a directory listing all the then known cycle students in North America.

Scientific Membership

The second step in the furtherance of our basic objective was taken in 1943 by the creation of a membership plan whereby all persons in the world who have done work in our field could join together in one comprehensive society.

The Journal

The third step was taken last year when we inaugurated the **Journal of Cycle Research**, a publication in which cycle students in every branch of natural and social science can report the results of their findings.

The fourth step, namely, the enlargement of our scientific membership and the free distribution of the **Journal of Cycle Research** to this membership and to college libraries, I mentioned at the beginning of this letter.

Some 3,000 scientists, the world over, have contributed to the fund of knowledge in respect to cycles, rhythms, and/or periodicities. Some of these men are dead but there are probably more than 1,500 persons who have contributed in one way or another to this subject who are still alive. It is our hope to enroll at least 1,000 of these persons into membership in the Foundation within the coming year and to make a free subscription to the **Journal of Cycle Research** available to each.

Young Men Needed

The training of a number of young men who can make the study of cycles their life work and who can either remain at Foundation headquarters or carry back into industry or the academic world a knowledge of the techniques already discovered and achievements already made will also serve to fortify our basic objectives.

Each year I am increasingly impressed with the necessity of cooperative activity if we are ever to solve the many problems that confront us.

Cordially yours,

Edward R. Dewey

Director

Research

A STOCK MARKET FORECAST MADE IN 1912

Summary

An amazing forecast of railroad stock prices made in 1912, using four periodicities, would, if anyone had followed it for the medium term moves, have build $1,000 up to $10,869 (disregarding brokerage) in the 31 years which followed.

By 1943, however, this forecast had got out of step with reality. Until revised it can not be relied upon.

In an article about the 41-month cycle in common stock prices which I wrote for our November 1951 report I told you that this cycle was discovered in 1912 by a mathematician employed by a group of New York speculators.

You may remember that I said that this group had heard that the Rothschilds had plotted the price of English Consols and had broken up their fluctuations into a series of repeating curves which, when projected and combined, they used for forecasting purposes. If it could be done for Consols in London why not for stocks in New York? So reasoned the New York group.

You may also remember that I told you that this nameless mathematician found three other cycles as well, and that a knowledge of these four cycles was bought in 1919 or 1920 by one of the large brokerage firms of New York City. One of the partners of this firm turned the original work sheets over to me a number of years ago so that I could tell him how to improve upon the work.

In my report for November 1951 I promised to print this original forecast for you sometime. It is now possible to do so.

The four cycles isolated in 1912 had the following lengths, amplitudes, and timings:

Cycle A. 20 years long, cresting July 1908, overall amplitude 45.

Cycle B. 41 months long, cresting July 1909, overall amplitude 27.

Cycle C. 14.45 months long, cresting September 1902, overall amplitude 11.

Cycle D. 8.2 months long, cresting midway between March and April 1909, overall amplitude of 7.

These cycles were all thought to be sine shaped.

I have diagrammed these four cycles exactly as they were diagrammed in 1919 on the brokerage firm's original work sheets, except that for convenience I have used (a) zig-zag waves instead of sine shaped waves, (b) four 8-month waves and one 9-month wave instead of five 8.2-month waves, and (c) alternate 14- and 15-month waves dropping out one month every 20 cycles, instead of using the given length of 14.45 months. I have projected these cycles to 1955 and combined them. Then, for comparison, I have shown the Standard & Poor's Corporation Index of Rail Stock Prices, adjusted for trend.

The conformation of the actual to the projection is remarkable, both in broad outline and in month by month detail.

The softness of the 10's, the strength of the 20's, the softness of the 30's, and the strength of the 40's was forecast clearly.

The three- to four-year cycles which pointed up the major moves were also forecast for more than 30 years with dramatic accuracy. Since about 1943, however, this part of the forecast has been of negative value.

The short cycles included in the projection have sometimes been fulfilled and sometimes not. If you are a wishful thinker you will concentrate on the examples of success. If you are a skeptic you will concentrate on the examples of failure. If you are a scientist you will make a study

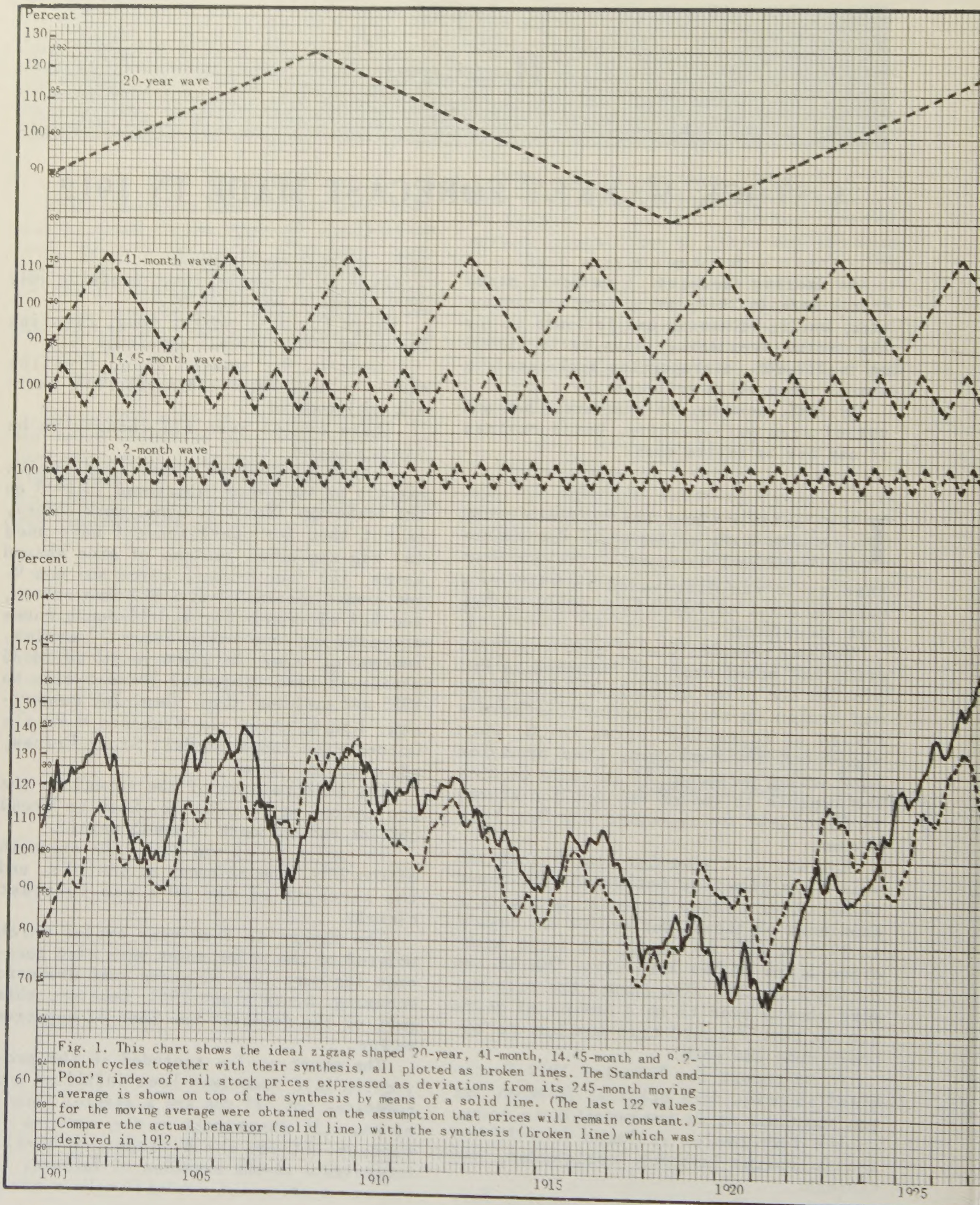
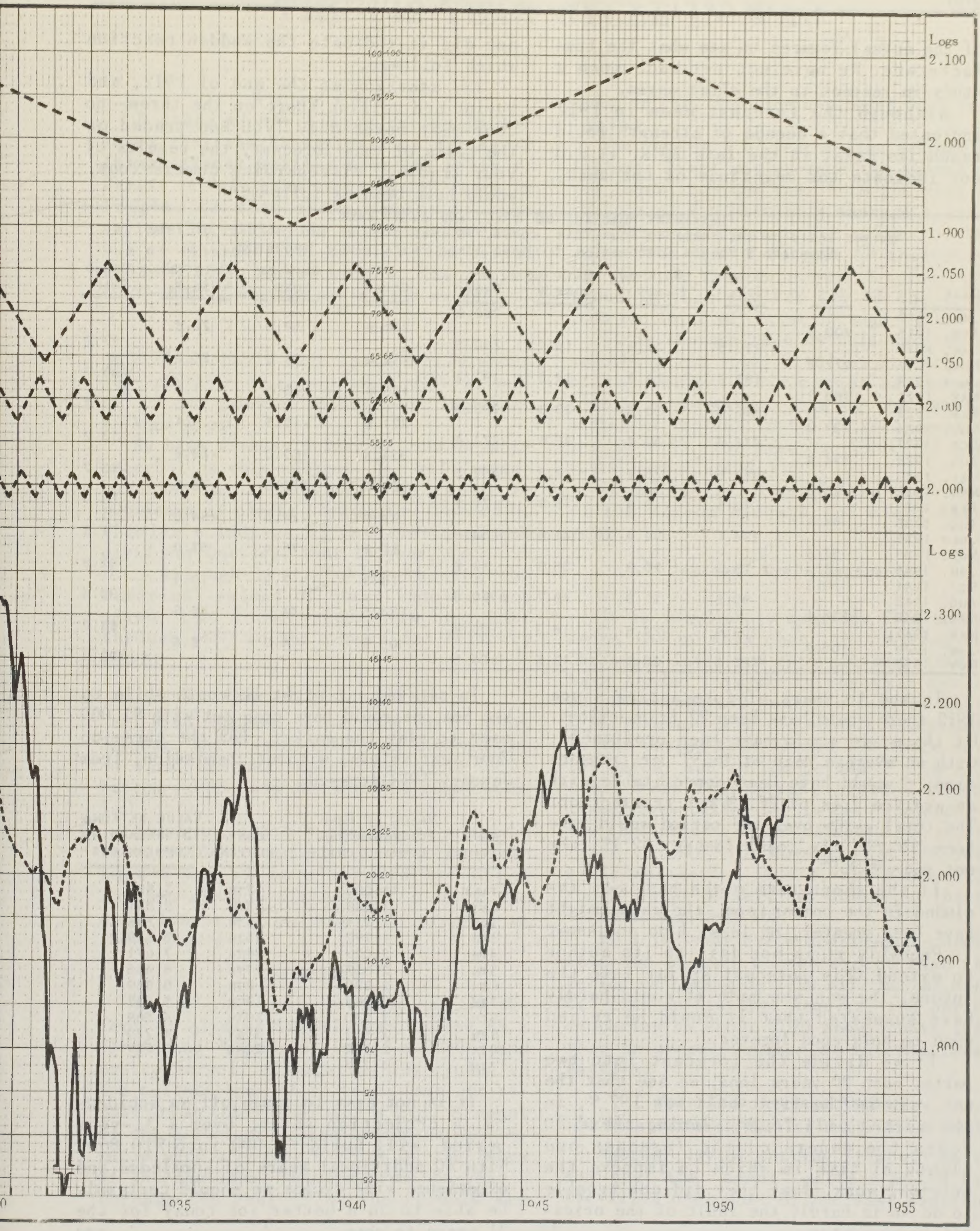


Fig. 1. This chart shows the ideal zigzag shaped 20-year, 41-month, 14.45-month and 9.2-month cycles together with their synthesis, all plotted as broken lines. The Standard and Poor's index of rail stock prices expressed as deviations from its 245-month moving average is shown on top of the synthesis by means of a solid line. (The last 122 values for the moving average were obtained on the assumption that prices will remain constant.) Compare the actual behavior (solid line) with the synthesis (broken line) which was derived in 1912.


Logs
2.100
2.000
1.900
2.050
2.000
1.950
2.000
2.000
Logs
2.300
2.200
2.100
2.000
1.900
1.800
1935
1940
1945
1950
1955

of the actual figures to see what the true facts are. We have not yet made such a study in respect to the short waves.

Although the forecast made in 1912 indicated that a decade of strength would reach its crest in the late 20's, it did not indicate the magnitude of the peak, nor did it indicate the sudden reaction which followed.

If, starting at the end of 1912, and buying and selling short on the three- to four-year moves only, you had traded on the basis of this forecast, the results of your trading, disregarding commissions, would have been as follows:

IMAGINARY PURCHASE AND SALE, AND SHORT SALE,
ON THE BASIS OF THE THREE TO FOUR YEAR MOVES, AS INDICATED BY THE FORECAST OF 1912
STANDARD & POOR'S CORPORATION RAILROAD STOCK PRICE INDEX, 1939=100.

DATE	BUY	SELL	GAIN OR LOSS	GAIN OR LOSS %	SHORT	COVER	GAIN OR LOSS	GAIN OR LOSS %	ROUND TRIP
JAN. 1913					259.8				
FEB. 1915	200.6					200.6	59.2	22.8	
JAN. 1916		230.5	29.9	14.9	230.5				37.7
NOV. 1917	172.3					172.3	58.2	25.2	
JULY 1919		197.2	24.9	14.5	197.2				39.7
MAY 1921	163.6					163.6	33.6	17.0	
FEB. 1923		202.5	38.9	23.8	202.5				40.8
NOV. 1924	221.0					221.0	-18.5	- 9.1	
OCT. 1926		271.4	50.4	22.8	271.4				13.7
AUG. 1928	334.4					334.4	-63.0	-23.2	
MAY. 1930		359.5	25.1	7.5	359.5				-15.7
MAR. 1932	87.0					87.0	272.5	75.8	
FEB. 1933		70.6	-16.4	-18.9	70.6				56.9
AUG. 1935	94.6					94.6	-24.0	-34.0	
JULY 1936		134.0	39.4	41.6	134.0				7.6
MAY. 1938	57.6					57.6	76.4	57.0	
JAN. 1940		78.2	20.6	35.8	78.2				92.8
OCT. 1941	70.3					70.3	7.9	10.1	
AUG. 1943		90.5	20.2	28.7	90.5				38.8
MAY. 1945	134.5					134.5	-44.0	-48.6	
MAR. 1947		109.9	-24.6	-18.3	109.9				-66.9
JAN. 1949	105.9					105.9	4.0	3.6	
NOV. 1950		126.5	20.6	19.5	126.5				23.1

In the 40 years of forecasting since 1912 there would have been 22 transactions. Of these, 16 would have been profitable, with an average gain of 26.3% per transaction; 6 would have been unprofitable with an average loss of 25.4% per transaction. The total gains over the period would have been 420.6%, the total losses 152.1%, the net gain 268.5%.

If the short-term moves had been included in the comparison, the gains might have been greater, or less, I do not know.

Probably it is not fair to its author to extend this forecast so far into the future. The man who made it would hardly have suggested that it could be relied upon to hold good forever.

If we divide the forecast into two parts, each 20 years long, we see that the net gain in the first half was 192 %, in the second half 76.5%. During these 20 years the owners of the forecast had plenty of time in which to improve the original work. That they did not trouble to do so is hardly the fault of the original investigator.

In closing, it might be worth while to see how one would have come out with $1,000 used to play the market, for the three to four year swings, without commission, from January 1913 forward.

TRANSACTIONS	VALUE OF FUND (DISREGARDING COMMISSIONS)	TRANSACTIONS	VALUE OF FUND (DISREGARDING COMMISSIONS)
START	$1,000	12TH	3,850
1ST	1,228	13TH	2,541
2ND	1,411	14TH	3,598
3RD	1,767	15TH	5,649
4TH	2,023	16TH	7,671
5TH	2,367	17TH	8,445
6TH	2,930	18TH	10,869
7TH	2,663	19TH	5,587
8TH	3,270	20TH	4,569
9TH	2,511	21ST	4,729
10TH	2,700	22ND	5,651
11TH	4,747		

It is not easy to laugh off as accidental a projection which, over a 31-year period, will build $1,000 into $10,869. With 40 additional years of knowledge and experience with cycles we should certainly be able to do a better job today for the 31 years to come.

erd

THE 142-YEAR CYCLE IN WAR

Summary

A study of the longer cycles in war shows that the characteristic cycles of international battles from the birth of Christ to date have averaged 142 years in length. If this cycle continues, the period 1915—1995 will show a maximum number of international battles, the period 1995—2055 a lesser number, the period 2057—2127 a maximum again, and so on.

YOU probably want to know more about rhythmic or repetitive cycles in war. I can think of nothing more important to know about.

We have already published considerable material on this subject. You will remember that in our February 1951 report we published 13 charts showing Dr. Raymond H. Wheeler's indexes of international and civil war battles, year by year, from 599 B.C. through 1943. Tables showing the numerical values of these indexes were given, too. These values were brought up through 1950 in our report for February 1952.

11-, 22-, & 57-Year Cycles

I also reported to you upon the 11-year, 22-year, and 57-year cycles in international wars (see our reports for April 1952, February 1951, and January 1951 respectively).

For this report I thought it would be interesting to manipulate the figures in such a way as to eliminate the three rhythms already discovered so as to see what longer cycles might be present in these figures.

Technical

As a 67-year moving average has the effect of eliminating 11-year cycles (6 x 11=66) and 22-year cycles (3 x 22=66) and pretty largely eliminating any cycles in the neighborhood of 57 years (see our report of October 1951 for a full account of the effect of moving averages) we computed such a moving average of the index of international battles from the year 1 through the year 1950. The results are shown in Fig. 1 on the two pages next following.

You compute a 67-year moving average as follows: First you average the values of the index from the year 1 to the year 67 inclusive. You plot this average at year 34. You next average the values of the index from year 2 to year 68 inclusive. You plot the results at year 35. You continue in this way for all of the years from the birth of Christ through 1950.

It is obvious that by this process of smoothing you lose 33 values at each end of the series. This cannot be helped. (There is no way of knowing the average number of battles in the 67 years centering in 1952, for example, until 33 more years have elapsed.)

In making Fig. 1 we plotted the values of the moving average for every fifth year.

142-Year Cycle Apparent

It is immediately apparent from an examination of this chart that during the Christian [sic] era international battles have tended to come in rhythmic cycles which average 142 years in length. There have, however, been two notable exceptions. In the period from 310 to 790 there were two waves, and in the period 790 to 1150 there were four waves, instead of the three waves called for in each instance by the concept of a cycle of about 142 years. Prior to year 310, however, the 142-year cycle reasserted itself, and since 1150 the 142-year pattern has dominated international war behavior.

If a 142-year cycle continues to dominate the picture we can expect that the period centering on 1950 will be the most war-like in history; however, the period centering on about 2020 should have less than an average number of international battles.

More Than Average Number of International Battles Until After 1985

Another way of putting it would be to say that the “ideal” pattern which has prevailed over most of the last nineteen hundred years calls for more than the average number of battles for the 70 years from 1915 to 1985 and a less than an average number of battles for the 70 years from 1985 to 2055.

If, as Professor Raymond H. Wheeler and others believe, there is a relationship between man's tendency toward international warfare and climate, there may prove to be cycles about 142 years long in various physical reflections of climate such as the alternate thickness and thinness of sedimentary rock deposits, the alternate thickness and thinness of tree rings, and the flood levels of great rivers like the Nile, where records are available back over hundreds and hundreds of years.

If we can find other such phenomena that fluctuate with a 142-year rhythm we will have some corroboration for the ideas of those people who believe that climate or other external forces have something to do with man's tendency toward international warfare.

Perhaps someday, if we can understand the causes of war more clearly, we can do something to minimize this activity. In the meantime, however, the best advice would seem to be to trust in the Lord and keep our powder dry, and in a safe place.

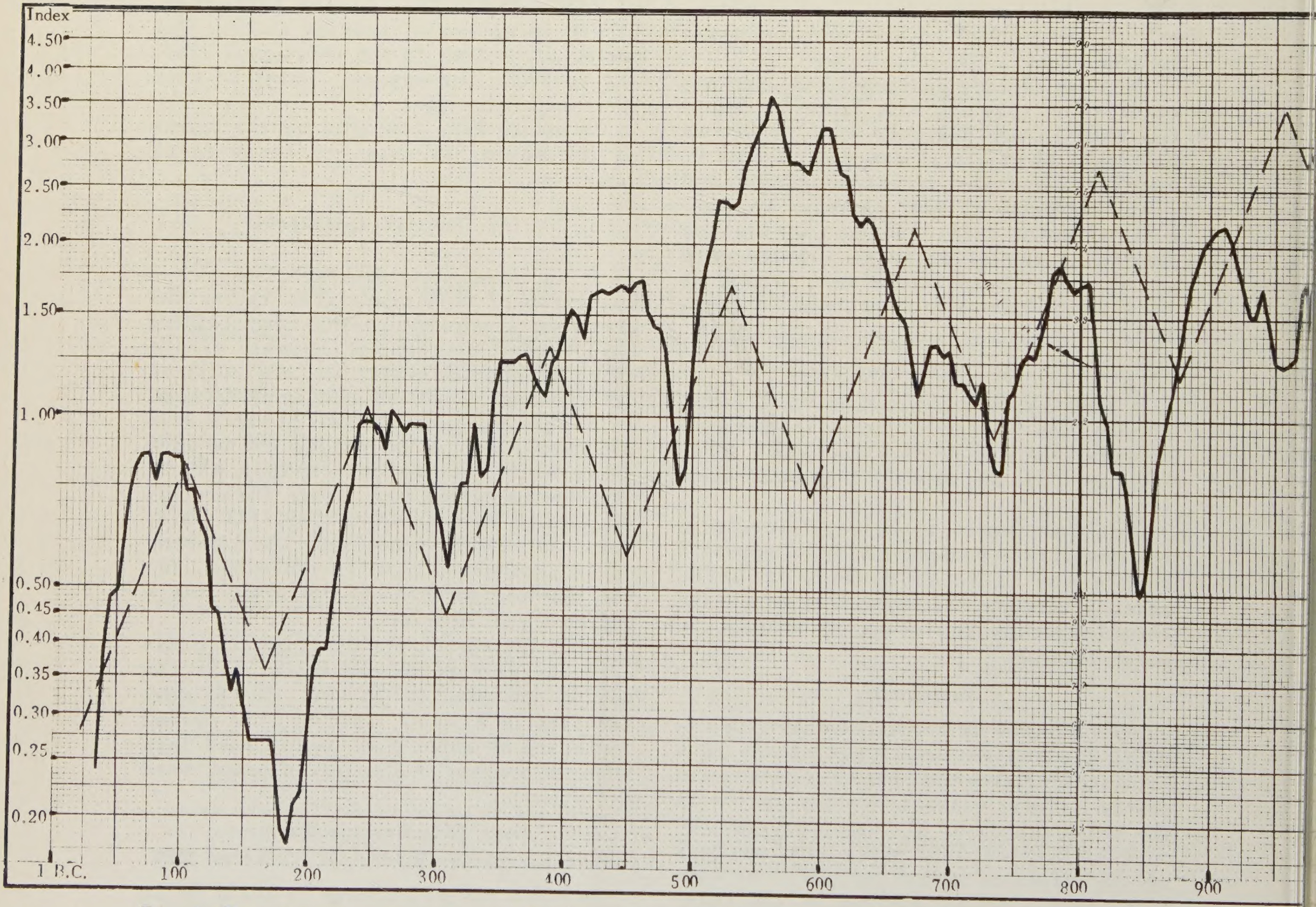
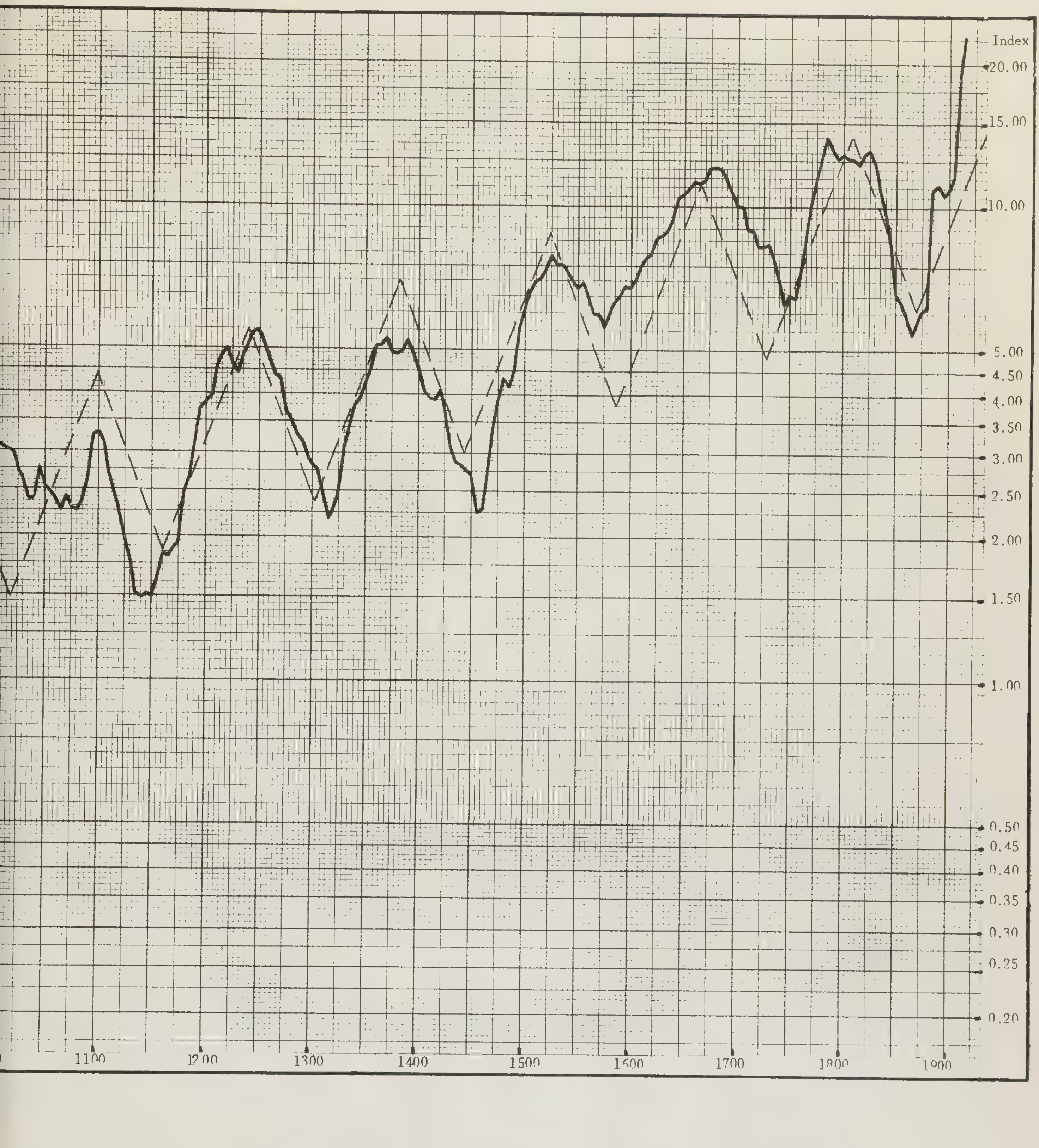


Fig. 1. The chart above shows the 67-year moving average of Professor Raymond H. Wheeler's index of international battles. The values for every fifth year are plotted. Note the continuous upward trend since 1 A.D. and the prevailing cycle of 142 years.


Index
20.00
15.00
10.00
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.45
0.40
0.35
0.30
0.25
0.20
1100
1200
1300
1400
1500
1600
1700
1800
1900

At this point it may interest you to see a synthesis and projection of the cycles in international conflict which have been isolated to date, namely the 142-year, the 57-year, the 22 1/5-year, and the 11 1/5-year cycles. To get values expressed in terms of battles instead of percentages we must also include a trend. This has been done, too.

As you can see from reference to Fig. 1, the trend has been gradually upward from the first century to the present time. It would however be a mistake to assume that this rising trend line proves a greater degree of combativeness on the part of human beings. We may be more combative, but at least part of the rise of the trend line must be attributed to the increased accuracy and extent of recorded history.

The 142-year cycle is so long that it is of no immediate practical consequence. The 57-year cycle is likewise too long to have any bearing on the present situation; moreover it has been studied over so short a period of time that no significance should be attached to it. However, the 22 1/5-year cycle and the 11 1/5-year cycle have both been studied over long enough periods and are of short enough time span so that they should be definitely useful in throwing light on present day affairs.

erd

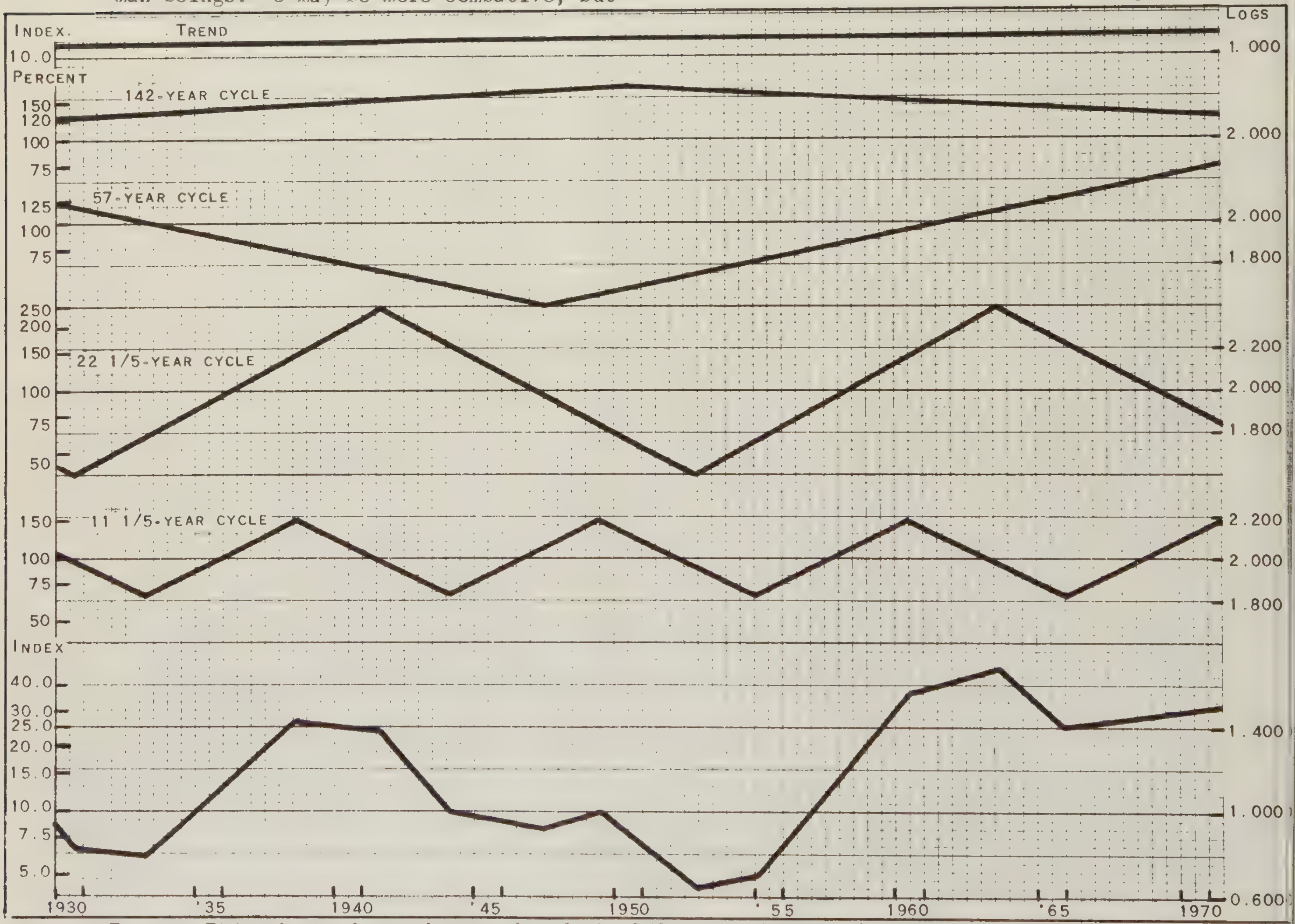


Fig. 2. This chart shows the trend and the 142-year, 57-year, 22 1/5-year, 11 1/5-year cycles as found in Professor Raymond H. Wheeler's index of international battles. The bottom curve represents the synthesis of these waves together with trend. The synthesis has been projected to give a general idea of future probabilities, if these cycles continue.

IS THERE A 17⅓-YEAR PATTERN IN STOCKS?

Mr. W. E. D. Stokes, Jr., of Lenox, Massachusetts, writes to say that he has observed a rough tendency for industrial stock market prices to repeat their behavior patterns at 17 1/3-year intervals.

Insofar as this tendency holds true and is not the result of accident, it suggests the possibility that there may be repetitive cycles in stock market prices which have wave lengths which are harmonics or near harmonics of 17 1/3-year.

Harmonics of 17 1/3 Years

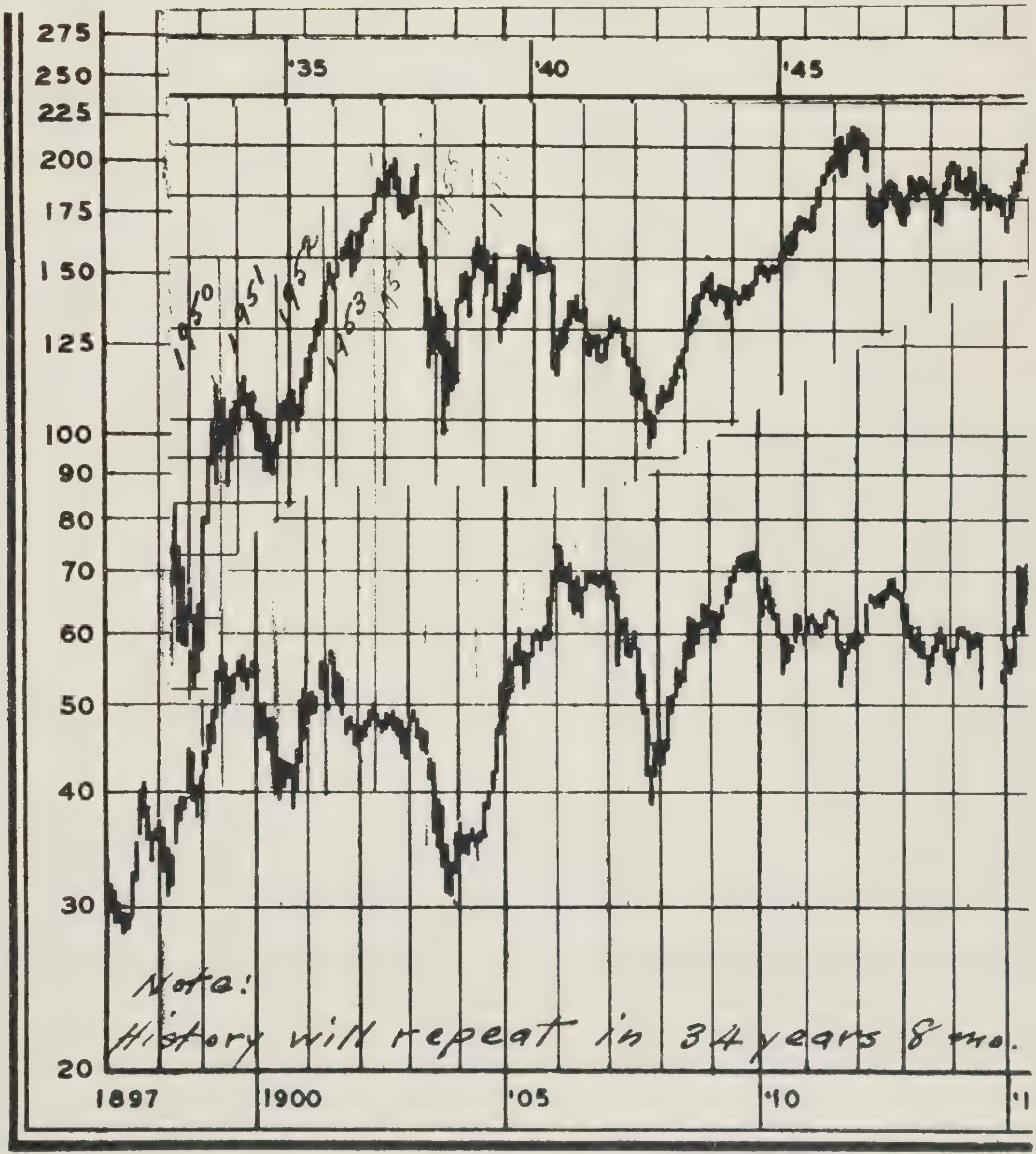
The harmonics of 17 1/3 years are as follows:

Fundamental	17.33	years	
2nd harmonic	8.67	"	(½ of 17 1/3 yrs.)
3rd "	5.78	"	(⅓ " " ")
4th "	4.33	"	(¼ " " ")
5th "	41.6	mos.	(⅕ " " ")
6th "	34.7	"	(⅙ " " ")
7th "	29.7	"	(⅐ " " ")
8th "	26.0	"	(⅛ " " ")
9th "	23.1	"	(⅑ " " ")
10th "	20.8	"	(⅒ " " ")

Etc.

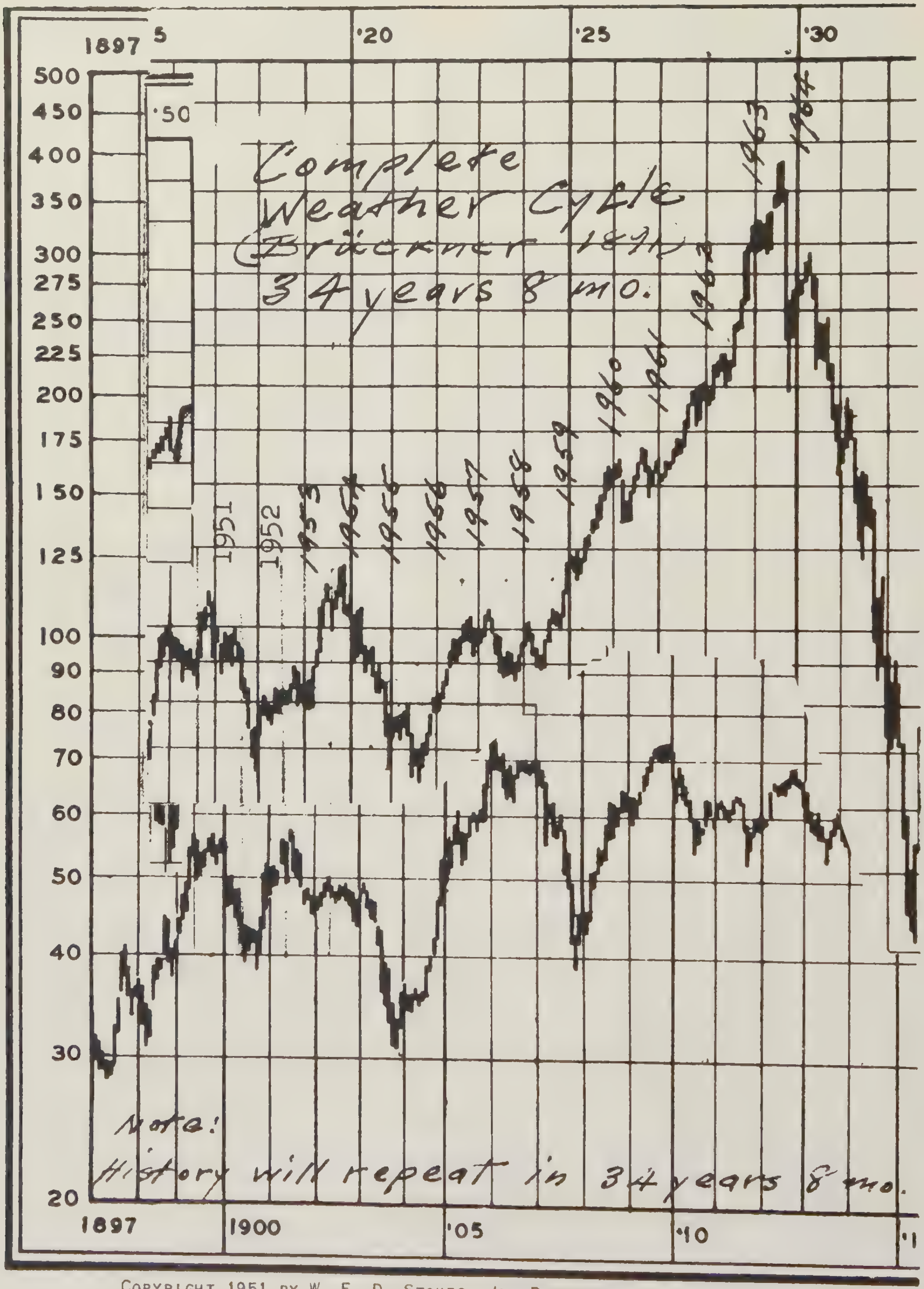
Readers may wish to compare behavior at 17 1/3-year intervals to see the extent to which they too notice this correspondence, and to run down the possibility of cycles at or near the wave lengths indicated.

erd



Note!
History will repeat in 34 years 8 mo.

Copyright 1951 by W. E. D. Stokes, Jr. Reproduced with permission.



Complete Weather Cycle (Brückner 1890) 34 years 8 mo.

Note! History will repeat in 34 years 8 mo.

COPYRIGHT 1951 BY W. E. D. STOKES, JR. REPRODUCED WITH PERMISSION.

POSSIBLE CYCLES IN PIG IRON PRICES, 1784–1951

Summary

A multiple harmonic analysis of pig iron prices, 1784—1951, suggests the length and amplitude of each of a number of cycles which may be present in these figures. Pig iron prices are important from the standpoint of cycle study, not only because pig iron is an important industrial commodity, but because of the success made by Samuel Benner in 1874 in forecasting prices of pig iron by means of cycles. Imaginary purchases and sales, and short sales, made on the basis of Benner's forecast showed a gain-loss ratio of 31 to 1 over a period of 65 years. The multiple harmonic analysis shown below is the first step toward another projection which it is hoped will be as good.

IN previous issues I have told you of the results of multiple harmonic analyses of railroad stock prices, 1831-1950 and industrial stock prices, 1871-1950. These accounts appeared in the April 1952 and May 1952 issues respectively. In this issue we present the results of a multiple harmonic analysis of pig iron prices, 1784-1951, made at the same time.

All these analyses were made possible by money supplied by Stockham Valves & Fittings of Birmingham, Alabama, a machine supplied by the Mico Instrument Company of Cambridge, Massachusetts, and the zeal of Alexander Malinowski of the Foundation staff, who worked 114 hours a week for three weeks in order to achieve the results in the time available.

It seems needless at this point to describe again the techniques and significance of multiple harmonic analysis except perhaps to state that peaks on the periodogram indicate (on the lower scale) the length of rhythmic repetitive cycles which may be present in the series of figures being analyzed.

If you want further information about multiple harmonic analysis and periodograms refer to our May 1952 report.

We have indicated for you by means of arrows the positions at which the periodogram curve seems to crest. These lengths, and the relative strength of the cycle indicated by each, are shown in the following table.

TABLE 1

CYCLE LENGTH AND AMPLITUDE
SUGGESTED BY PERIODOGRAMS.

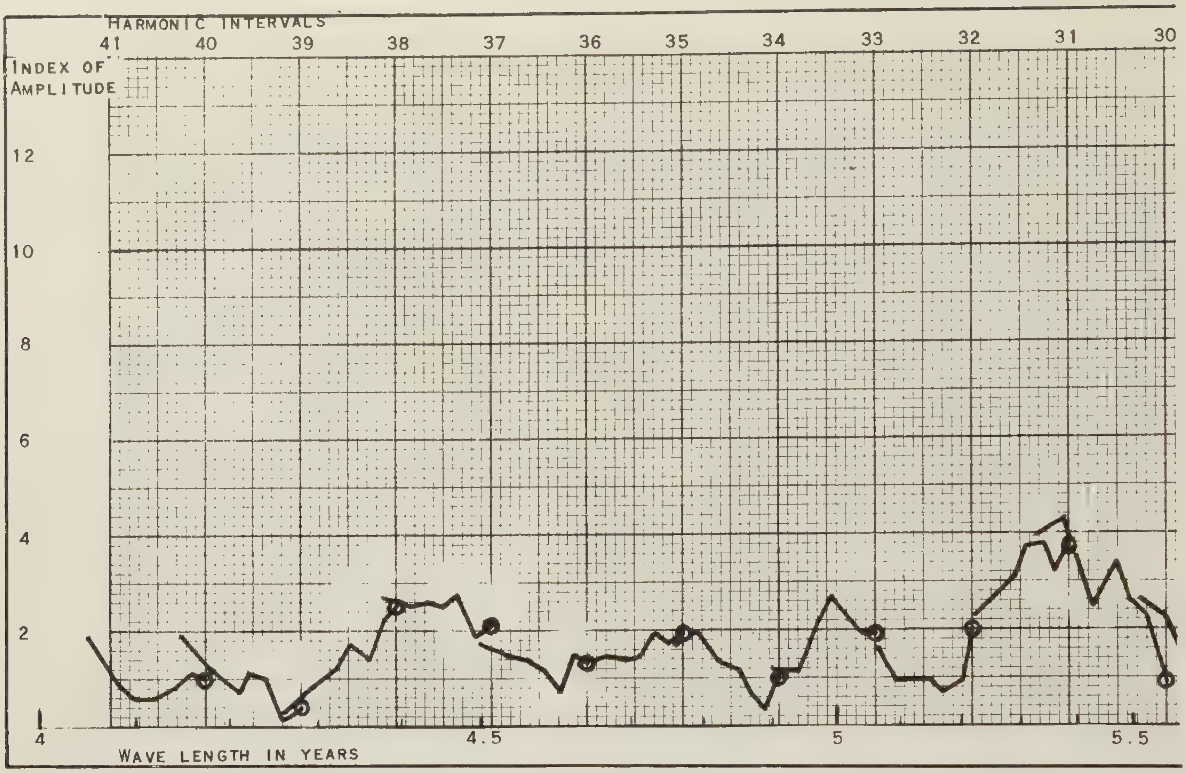
LENGTH IN YEARS	AMPLITUDE	LENGTH IN	AMPLITUDE	LENGTH IN YEARS	AMPLITUDE
4.1	1.8	5.8	3.1	7.9	4.8
4.2	1.6	5.9	3.1	9.1	11.0
4.3	1.8	6.1	3.9	9.2	11.1
4.5	2.8	6.3	1.9	10.4	5.8
4.6	1.5	6.4	2.3	11.1	2.2
4.7	2.0	6.5	2.2	12.2	2.5
4.8	2.0	6.6	2.1	13.8	9.6
5.0	2.7	6.8	4.6	15.2	8.5
5.1	1.2	6.9	4.2	17.8	16.4
5.3	4.4	7.2	2.7	27.8	11.8
5.4	4.3	7.4	2.8	52.2	21.4
5.5	3.4	7.6	2.8	151.8	41.2

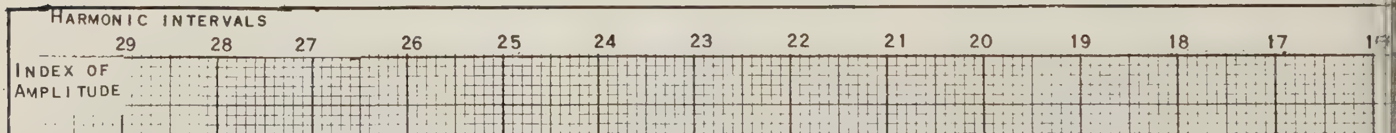
These lengths must be thought of merely as hints which must be explored by more intensive methods of research. They have, however, the virtue that they give a continuous spectrum of possibilities, and that the machine had no preconceived notion of cycles which "ought" to be present in this series of figures.

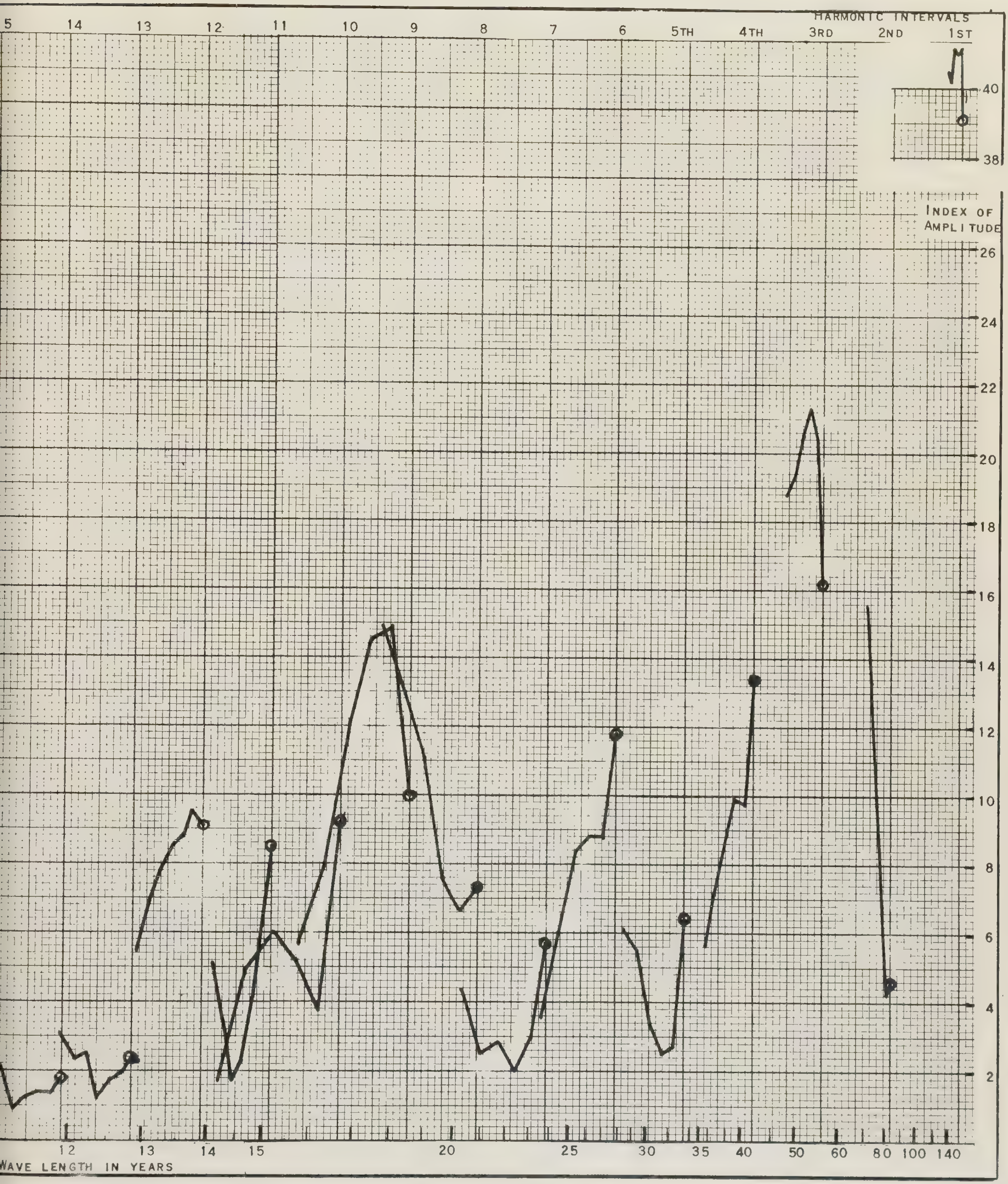
When these various hints have been explored it may be possible to duplicate the feat of Samuel Benner. In 1874, using merely a knowledge of cycles, Benner made a forecast of pig iron prices which is one of the outstanding achievements of cycle research. If you had bought and sold, and sold short and covered, except during World War I, on the basis of this forecast you would have made 288.5% as against losses of 9.3% for the period 1874 to World War II. These figures work out to a gain-loss ratio of 31 to 1. If you had used the formula right through World War I, your gains would have been 425.8%, making a gain-loss ratio of 44.8 to 1. Benner's forecast was discussed in detail in our reports for February and March 1952.

With the aid of the multiple harmonic analysis presented herewith, it may be possible to duplicate Benner's success.

erd


HARMONIC INTERVALS
41
40
39
38
37
36
35
34
33
32
31
30
INDEX OF AMPLITUDE
12
10
8
6
4
2
4
4.5
5
5.5
WAVE LENGTH IN YEARS


HARMONIC INTERVALS
29
28
27
26
25
24
23
22
21
20
19
18
17
INDEX OF AMPLITUDE
12
10
8
6
4
2
6
6.5
7
8
9
10
WAVE LENGTH IN YEARS


5
14
13
12
11
10
9
8
7
6
5TH
4TH
3RD
2ND
1ST
HARMONIC INTERVALS
40
38
INDEX OF AMPLITUDE
26
24
22
20
18
16
14
12
10
8
6
4
2
12
13
14
15
20
25
30
35
40
50
60
80
100
140
WAVE LENGTH IN YEARS

How has it worked out?

With this issue we are inaugurating a new department in which we plan to bring up to date the charts published previously so that you can see how the various cycles have worked out.

The 57-Year Cycle in International Conflict

In our report for January 1951 I showed you that if we smoothed Professor Wheeler's index of international battles from 1751 through 1943 we obtained three cycles which averaged 57 years in length.

I called attention to the fact that from a series as short as this one, relative to the length of the cycle, no one could tell if this cycle represented the effect of some real rhythmic force—perhaps climatological—which might be expected to continue, or represented merely three larger upswings in the number of international battles which just happened to come approximately 57 years apart. In other words, I offered no conjecture as to the significance of this cycle.

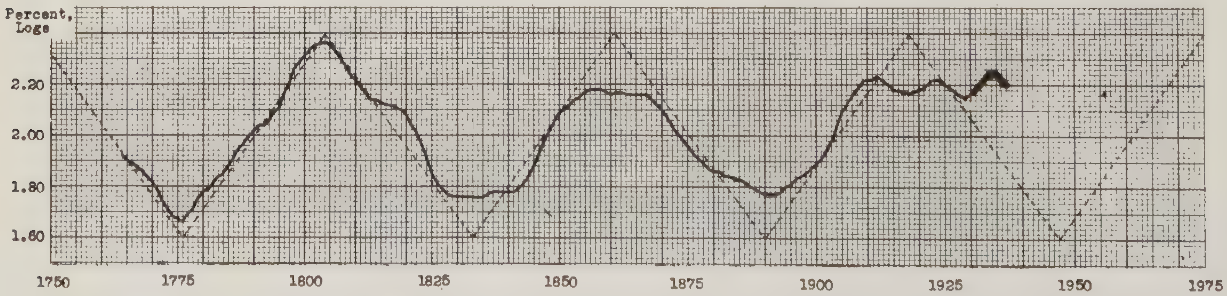
At the time this work was done we did not have Professor Wheeler's earlier figures or his figures from 1943 forward.

After the work on the 57-year cycle was completed Professor Wheeler turned over to us his index from 599 B.C. (which we published in our report for February 1951) and continued his index through 1950. This gives us seven additional points on the curve which are shown by a heavy line and indicate how the current 57-year cycle is unfolding. It also gives us opportunity, when time permits, to see whether or not this 57-year rhythm continued backward through time or was merely a random fluctuation.

The fact that the curve did not go down indicates one of three things.

1. Perhaps the current cycle is being distorted.
2. Perhaps the length of the cycle is slightly more than 57-years.
3. Perhaps these three waves are merely random manifestations and have no significance for forecasting or for any other purpose.

Which of these three possibilities is the right one cannot be told until we have time to smooth the earlier figures to see whether or not this cycle continued backward and if so, to find out its exact length over a long period of time.



The number of international battles plus one, 1751—1950, smoothed by a 5-year moving average and a 23-year moving average and expressed as percentages of their underlying trend. A perfectly regular 57-year wave has been added by means of a broken line. Values from 1938 to 1950 are missing because they are lost in the smoothing process. This chart is a reproduction of the chart published on page 5 of our report for January 1951 with seven additional values added by means of a heavy line. (The curve from 1905 through 1930 is slightly higher than the curve originally published because of revised figures for 1917—1920.) Ratio scale.

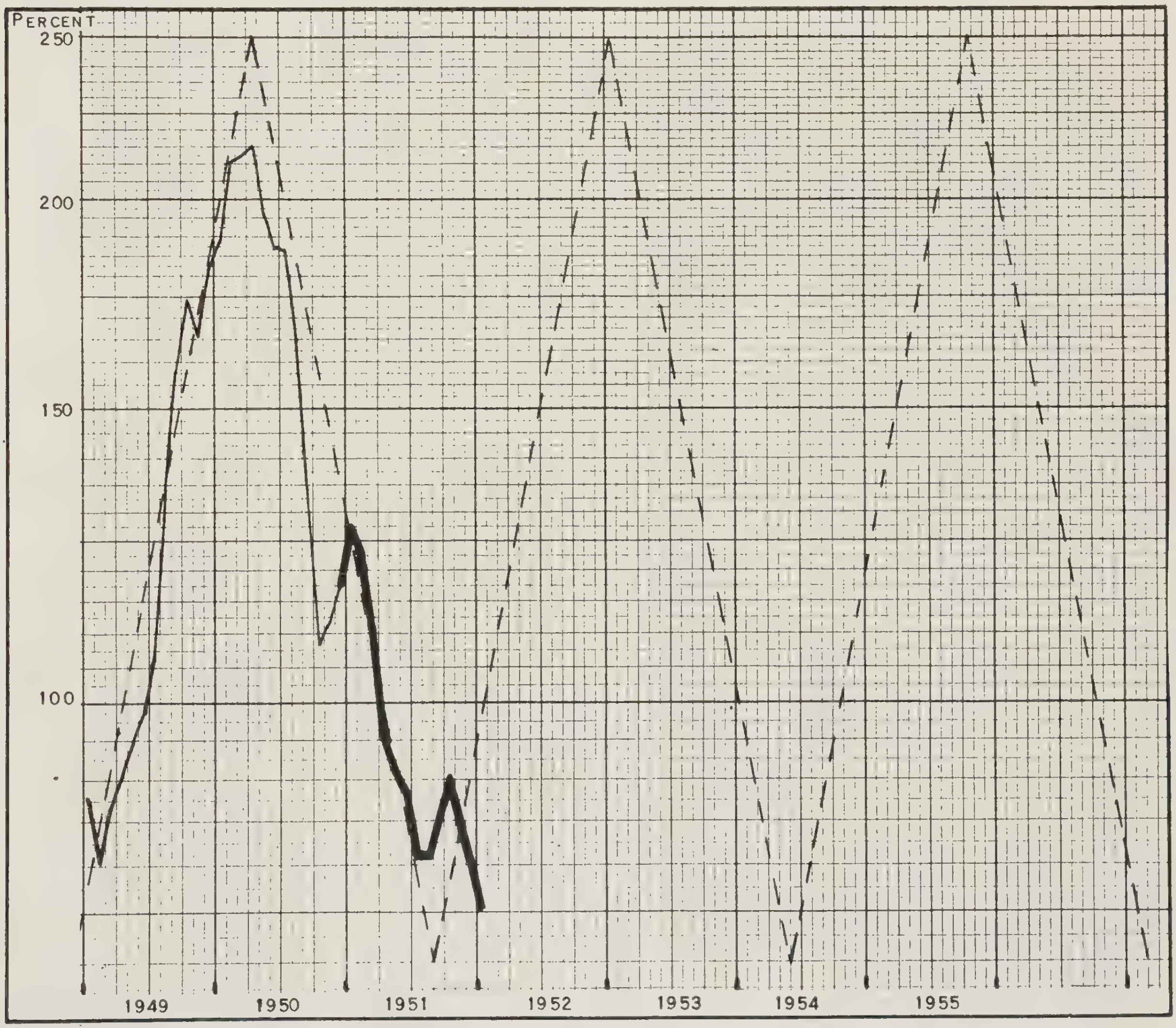
The 33-Month Cycle in Residential Building Construction

You will remember that in our report for April 1951 I told you of the 33-month cycle in building construction discovered in 1939 by Professors F. A. Pearson, W. I. Myers, and G. E. Brandow. This cycle was badly distorted by the war but has latterly reasserted itself.

In this report I showed you this cycle through December of 1950 and made a projection to show what would happen if this cycle continued.

The extra heavy line from January 1951 to January 1952 shows how these figures have behaved during the past year. It is easy to see that the expected decline materialized.

We are now at a place where some lessening of the decline relative to the previous year can be expected if this cycle in these figures continues.



Rate of change of residential building construction, January 1949—January 1952, together with a perfectly regular 33-month zigzag as projected in 1939 by Professors F. A. Pearson, W. I. Myers, and G. E. Brandow.

The curve represents a three-month moving average of the 12-month moving percentage of the F. W. Dodge Corporation's valuation of residential building construction contracts awarded in 37 states. The new figures which have become available since the report for April 1951 have been plotted by means of a bold line.

Technical

TECHNIQUES INVOLVED IN THE JANUARY 1952 ARTICLE ENTITLED "THE 37-YEAR CYCLE IN THE FREQUENCY OF CHINESE EARTHQUAKES"

Lack of space made it necessary to defer until this issue the technical supplement to an article which appeared in the January 1952 report entitled 'The 37-Year Cycle in the Frequency of Chinese Earthquakes."

The Data

The data used were taken from Fig. 1 of an article by H. W. Clough called 'The 11-Year Sun-Spot Period, Secular Periods of Solar Activity, and Synchronous Variations in Terrestrial Phenomena." This article appeared in the **Weather Review** for April 1933.

In speaking of these data Clough said, "A number of catalogs of earthquakes are available for the study of their periodicities. The most extensive one is by Mallet in the British Association Report of 1858. Extensive catalogs of Chinese earthquakes have appeared but there are, especially in the later ones, too many entries for a single large shock, due to the aftershocks and to the large number of provinces reporting it, so that the list is unsuitable for analysis. Turner* made a periodogram analysis of the list of earthquakes in China compiled by Hirota, in British Association Report, 1908, since he regarded it as sufficiently homogeneous for this purpose. He pointed out that periods of around 79 and 284 years appeared probable. Hirota's list ends in 1645. Parker's list in British Association Report, 1909, extends from 1640 to 1875, but it lists only the greater shocks. It is, however, internally homogeneous and shows the 37-year period fairly well.

'I have counted the number of shocks in these two lists for each 20-year period,

---

*Turner, H. H., 1925. Note on the 284-year period in Chinese Earthquakes, Mon. Not. Roy. Astr. Soc., Geoph. Suppl., Vol. I, No. 6.

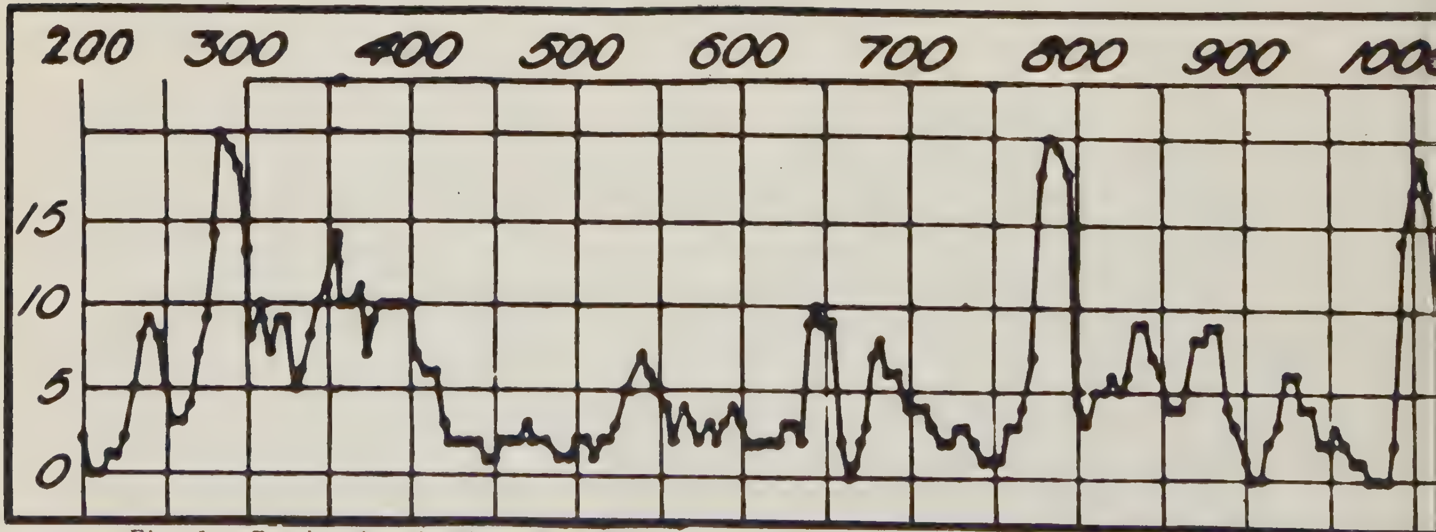


Fig. 1. Earthquakes in China from 200 A.D. to 1865. Each point represents the number of quakes for the 20 years centering on the five year interval indicated. Three different

........and the number for each fifth year is plotted in Fig. 1. Between A.D. 195 and 224 there are no records owing to the Great Rebellion."

Clough does not explain where he gets his 20-year averages prior to 235 A.D. if there are no records prior to 225 A.D., but the matter is not too important as only a few points are involved.

Neither does Clough explain the break in the index in the last half of the thirteenth century but presumably a much more complete index was available from about 1270 forward to about 1650.

Adjustments

To make the series as nearly as possible homogeneous from the standpoint of cycle studies we proceeded as follows: First, we read off the values from Clough's chart as well as possible, from end to end. For the curve from 200 to 1290 inclusive we used the values as shown. From 1275 to 1645 inclusive we used half values because of Clough's change of scale. From 1270 to 1290 inclusive we averaged the two overlapping values thus obtained.

From 1650 forward, in view of the fact that only the largest earthquakes were included in the index, we multiplied the values shown by 1 1/2 to make them correspond to the other values of the chart.

These manipulations gave us an index of Chinese earthquakes 200 A.D. to 1875 in which at five-year intervals we have values for the 20 years centering on that year. These values are given in the following table (page 214).

For convenience in manipulation, the index was then expressed in logarithms, in accordance with our usual custom. As there is no logarithm for zero, the values for those years where there were no earthquake values were shown as log of 1/10. From this point forward where we speak of the index it will be understood to mean the logarithms of the index.

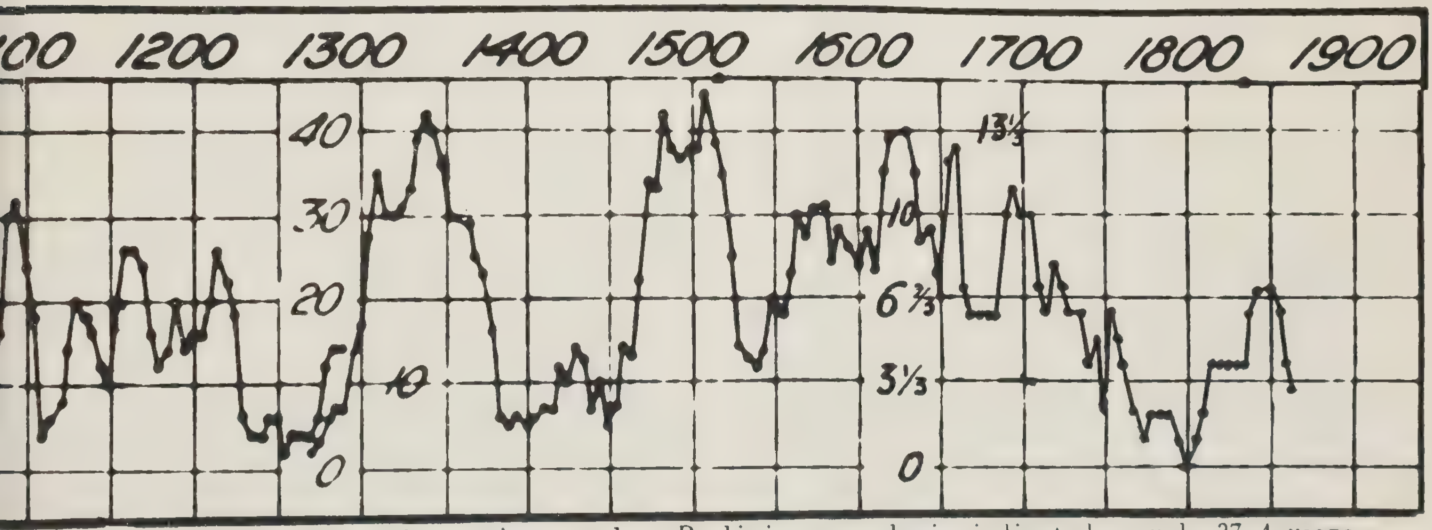
Deviations

In view of the rather wide fluctuations in the data, we thought it desirable to express the index values as deviations from their seven item (35-year) moving average and to analyze these deviations instead of the original data. This was done and the results are shown in Fig. 2 below.

The Arithmetic

For the benefit of those who are a little rusty on their statistics it might be well to show the arithmetic of the procedure. It is shown in Table 2 below:

Table 2 shows the calculations for the beginning of the series using data from 200 A.D. to 265 A.D. The stub of this table shows the various dates at five-year intervals from the year 200 A.D. to the



·indexes are used; hence three scales. Preliminary analysis indicated a cycle 37.4 years long, but more recent work shows that a cycle of 35.2 years is more likely. After Clough.

TABLE 1

INDEX OF CHINESE EARTHQUAKES

YEAR	INDEX	YEAR	INDEX	YEAR	INDEX	YEAR	INDEX	YEAR	INDEX	YEAR	INDEX
200	2.4	480	2	755	1	1035	11	1310	17.5	1590	14
05	0	85	1.5	60	3	40	14	15	15	95	13
10	0	90	1	65	3	45	14	20	15	1600	12
15	1.3	95	1	70	4	50	12	25	15.5	05	13
20	1	500	2	75	7	55	8	30	16.6	10	14
25	2.4	05	2	80	18	60	16	35	19.5	15	11.5
30	5	10	1	85	20	65	17	40	21	20	17.5
35	8.5	15	2	90	19.5	70	16	45	20	25	19.8
40	9.5	20	2	95	18	75	14	50	18	30	20
45	8.5	25	3	800	4	80	4	55	15	35	17.5
50	5	30	5	05	3	85	8	60	15	40	13.5
55	3.2	35	6	10	5	90	15	65	14.5	45	14
60	3.2	40	7.2	15	5	95	16	70	12.6	50	11.5
65	4	45	6	20	6	1100	12	75	12	55	18
70	7	50	5	25	5	05	9	80	8	60	19
75	9.1	55	4	30	6	10	2	85	3	65	10.5
80	14	60	2	35	9	15	3	90	2.5	70	9
85	20	65	4	40	9	20	4	95	3	75	9
90	19	70	3	45	7	25	7	1400	2.5	80	9
95	18	75	2	50	6	30	10	05	3	85	9
300	13.5	80	3	55	4	35	9	10	3.5	90	15
05	8	85	2	60	4	40	8	15	3.5	95	16.5
10	10	90	3	65	5	45	6	20	6	1700	15
15	7	95	4	70	8	50	5	25	5	05	15
20	9	600	3	75	8	55	10	30	7	10	10.5
25	9	05	2	80	9	60	13	35	6.5	15	9
30	5	10	2	85	9	65	13	40	3.5	20	12
35	6	15	2	90	4	70	12	45	5	25	10.5
40	8.1	20	2	95	3	75	8	50	2	30	9
45	10	25	3	900	1	80	6	55	3	35	9
50	11	30	3	05	0	85	7	60	7	40	6
55	14.5	35	2.2	10	0	90	10	65	6.5	45	7.5
60	10	40	9	15	2.2	95	7	70	11	50	3
65	10	45	10	20	3.2	1200	8	75	17	55	9
70	11	50	9	25	6	05	8	80	16.5	60	7.5
75	7	55	9	30	6	10	10	85	21	65	6
80	9	60	2	35	4	15	13	90	19	70	3
85	10	65	0	40	4	20	11	95	18	75	1.5
90	10	70	2	45	2.2	25	9	1500	19	80	3
95	10	75	3	50	2.2	30	3	05	19	85	3
400	10	80	7	55	3	35	2	10	22.5	90	3
05	7.5	85	8	60	2.2	40	2	15	19.2	95	1.5
10	6	90	6	65	1	45	3	20	17.3	1800	0
15	6	95	6	70	1	50	3	25	12.5	05	1.5
20	3	700	4	75	0	55	1	30	2	10	3
25	2	05	4	80	0	60	2	35	1.5	15	6
30	2	10	4	85	0	65	2	40	1	20	6
35	2	15	3	90	2.2	70	1.5	45	1.8	25	6
40	2	20	2	95	14	75	2.2	50	5	30	6
45	1	25	2	1000	17	80	4.5	55	4	35	6
50	1	30	3	05	19	85	5.2	60	11.5	40	9
55	2	35	3	10	17	90	5.2	65	15	45	10.5
60	2	40	2	15	6	95	7	70	13.5	50	10.5
65	2	45	1	20	5	1300	8	75	15.3	55	9
70	3.5	50	1	25	3	05	14	80	15.5	60	6
75	2			30	8			85	12	65	4.5

year 265, inclusive.

The first column, labeled A, shows the data taken from Table 1 above except that the zero has been changed to a .1 because there is no logarithm for 0.

The second column, labeled B, shows the logarithms of the values shown in column A. The third column, labeled C, is the seven-item moving average of the figures in column B.

The first item in column C (posted at year 215) represents 1/7 of the sum of each of the first seven items in column B. The second item in column C (posted at year 220) represents 1/7 of the sum of each of the second to the eighth items inclusive. The third item in column C (posted at year 225) represents 1/7 of the sum

TABLE 2

WORKSHEET

Year	A Data	B Logs of data	C 7-item mov. aver. of col. B	D Deviations col. B+2.000 – col. C
200	2.4	0.380		
205	0.1	-1.000		
210	0.1	-1.000		
215	1.3	0.114	-0.061	2.175
220	1.0	0.000	0.017	1.983
225	2.4	0.380	0.300	2.080
230	5.0	0.699	0.576	2.123
235	8.5	0.929	0.659	2.270
240	9.5	0.978	0.731	2.247
245	8.5	0.929	0.749	2.180
250	5.0	0.699	0.735	1.964
255	3.2	0.505	0.723	1.782
260	3.2	0.505	0.721	1.784
265	4.0	0.602	0.752	1.850

of the third to the ninth values in column B, and so on down the page.

(For a full explanation of the use of moving averages in cycle analysis refer to the Foundation's **Technical Bulletin Number 4**, reprinted in full as a supplement to the October 1951 report.)

The seven-item (35-year) moving average in column C slides through the 35 to 37 year waves just as the water line on an ocean liner slides through the waves of the ocean. However, such a moving average, like the liner, goes up and down with the big tides. The result is that if we compare the actual behavior with this "water line" we get the 35 to 37-year waves and the smaller waves mostly undisturbed and by themselves. In other words, we get rid of the big ground swells.

We therefore want the difference between the logs of the data (column B) and their seven-item moving average (column C). We can obtain this value by subtracting each item in column C from the corresponding item in column B. However, this procedure will result in many negative logarithms. As positive logarithms are easier to work with, we add 2.000 as a constant to each value in column B. The result of this addition is that all of the differences between column B and column C become positive numbers and represent percentages instead of ratios.

Thus the first item in column D is obtained as follows:
0.114 (from column B) + 2.000 (the constant) – (-0.061) from column C = 2.175, column D.

The second item in column B (posted at year 220) is obtained as follows:
0.000 + 2.000 – 0.017 = 1.983. The third value in column D is 0.380 + 2.000-0.300 = 2.080. And so on down the page.

The operation is shown graphically in Fig. 2 where the actual values (column B) are shown by means of a solid line "a," the moving average (column C) by means of a broken line "b," and the deviations or differences (column D) by means of cross hatching.

The deviations (column D) are shown by themselves below in curve "c."

The Analysis

As Clough had preliminary indications of a 37-year cycle in these figures, we started our analysis by throwing the values of column D into a 37-year periodic table. As our figures represent 20-year averages at 5-year intervals, 7.4 items corresponds to 37 years. Consequently, what we actually did was to make a 7.4-item periodic table.

The Periodic Table

A 7.4-periodic table is merely an arrangement of the data in rows that average 7.4 items long, one row under the other, as shown in Table 3 below. In Table 3 the stub represents the base year, the first column, labeled 1, represents the first item (5 years) after the base year. The next column, labeled 2, represents the second item i.e., 10 years after the base year, and so on across the page to the eighth column which is called 7.4. This column contains four items and six blanks in each 10 lines.

The entire periodic table was something over 44 lines long, but the reproduction of the first 11 lines should be enough to make the procedure plain.

If there were a regular 7.4-item (37-year) cycle present throughout this series of figures the crests of such a cycle would all fall approximately in the same column of a 7.4-item periodic table. The troughs would all fall approximately in another column—probably about four items one way or the other from the crest.

To see whether or not there is a regular 37-year cycle present consistently on the average in each quarter of the data, the 7.4-item periodic table was divided into four parts, one of which is reproduced below. The figures in each column of each quarter of the periodic table were averaged. Obviously, such an averaging process would have no effect on any regular 37-year cycle present, but would minimize the random fluctuations. However, in 11 cycles we could not expect that every excessive high would have an equally excessive low to offset it. Therefore, we eliminated the three highest and three lowest values in each column before averaging. These excessive high and low values were circled in Table 3 below. In other words, speaking technically, we took the average median of each column instead of the mean.

The result of this manipulation for each of the four groups of 11 cycles is shown in Table 4 below and is plotted in Fig. 4. For convenience the average waves disclosed are repeated in phantom.

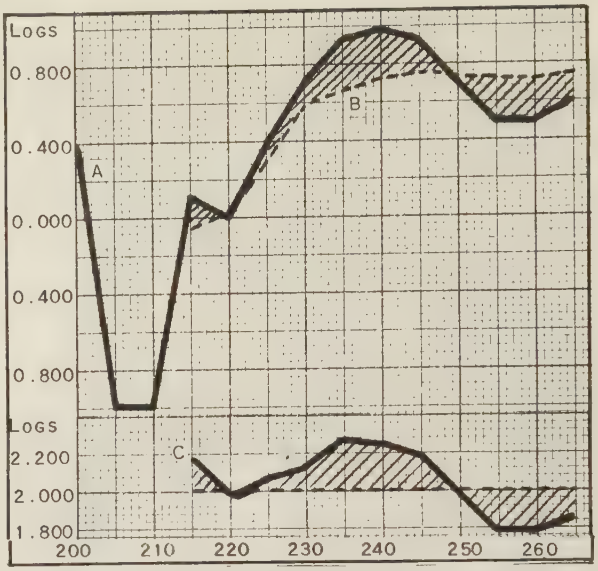


FIG 3. CHINESE EARTHQUAKES 200 — 265 A. D. CURVE A (SOLID LINE) REPRESENTS LOGS OF INDEX. CURVE B (BROKEN LINE) SHOWS THE 7-ITEM MOVING AVERAGE OF THE LOGS OF THE INDEX. CURVE C (LOWER CHART) GIVES THE INDEX EXPRESSED AS DEVIATIONS FROM TREND.

Slippage

It is obvious that the crests of the various cycles present on the average in each quarter of the series do not fall under each other. Thus 37 years is not the length of the dominant cycle in these figures.

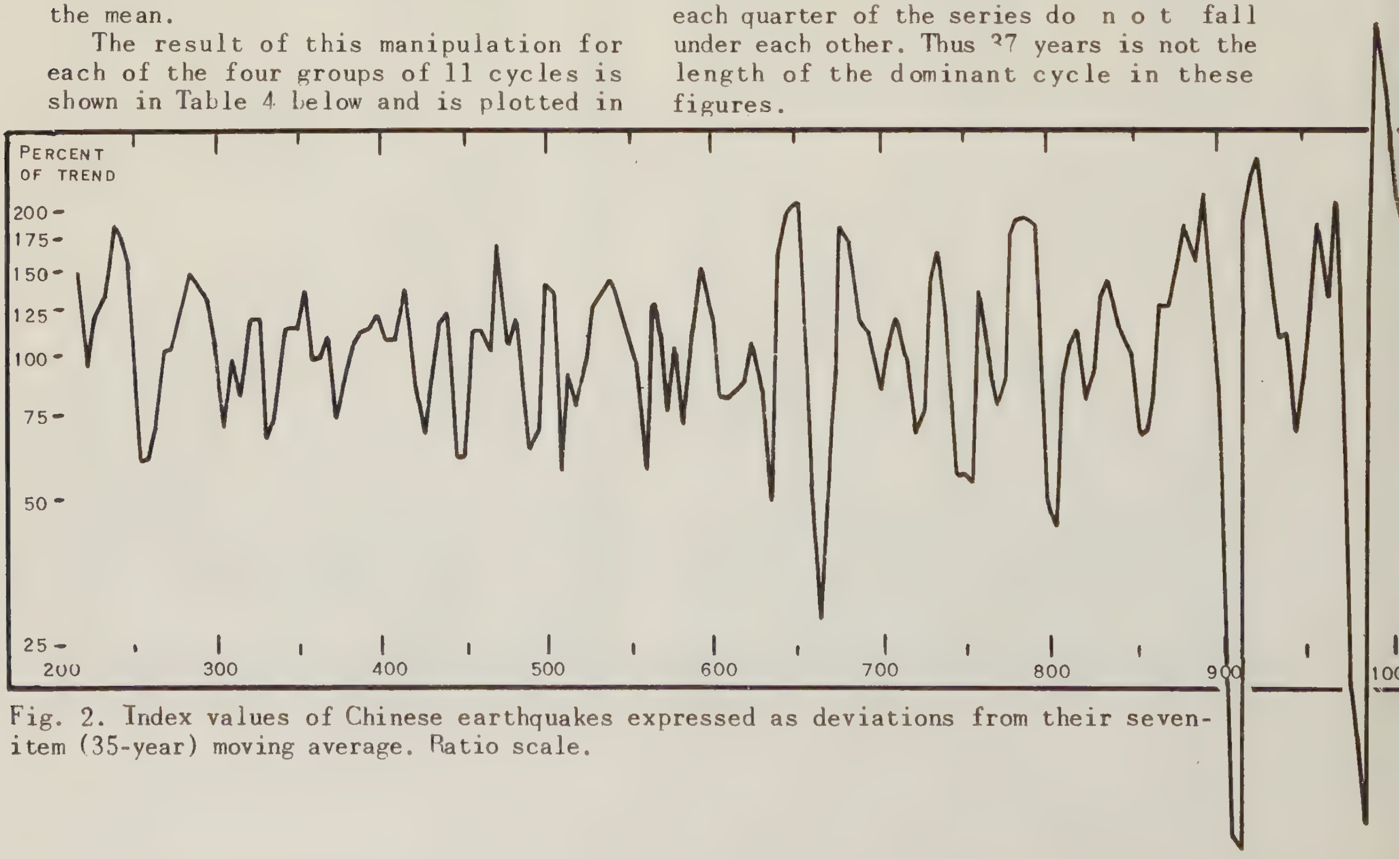


Fig. 2. Index values of Chinese earthquakes expressed as deviations from their seven-item (35-year) moving average. Ratio scale.

TABLE 3

37-YEAR (7.4-ITEM) PERIODIC TABLE OF THE DEVIATIONS OF LOGS OF DATA FROM THEIR 35-YEAR MOV. AVERAGE

Base	1	2	3	4	5	6	7	7.4
195				2.175	1.988	2.053	2.123	x
230	2.270	2.247	2.180	1.964	[illegible]	1.784	1.855	2.007
270	2.011	2.091	2.170	2.145	2.110	2.028	[illegible]	x
305	1.914	1.913	2.078	2.077	1.822	1.875	1.974	2.059
345	2.057	2.139	1.967	1.994	2.041	[illegible]	1.977	x
380	2.023	2.047	2.056	2.081	2.031	2.034	2.134	x
415	1.935	1.839	1.950	2.061	2.056	1.755	1.725	2.051
455	2.051	2.008	2.226	2.036	2.069	1.944	1.865	x
490	1.846	2.147	2.129	[illegible]	1.911	1.893	1.981	[illegible]
530	2.122	2.155	2.105	2.039	1.985	1.744	2.109	x
565	2.043	1.882	2.015	1.854	2.059	2.182	2.033	x
600	1.907	1.907	1.925					

Examination of Table 4 or Fig. 4 shows that there is a rather regular slippage of the average wave four positions to the left, or 3.4 positions to the right.

If the wave found on the average in the second group of 11 cycles has its crest and trough four positions to the left of the crest and trough of the wave found on the average in the first group of 11 cycles it is obvious that we have a slippage of four positions in 11 cycles. A slippage of four positions in 11 cycles amounts to a slippage of 4/11 positions or .36 positions per cycle. This indicates a length of 7.4 items minus .36 items or 7.04 items per cycle. As each item represents five years, the indicated length is 35.2 years.

On the other hand, if the slippage is to the right we have an indicated length of 7.4 + 3.4/11, or 7.71 items, or 38.5 years.

The only remaining task ahead of us in this preliminary examination of figures is to determine which of these lengths is the true length of the average cycle or whether average waves of both lengths are pre-

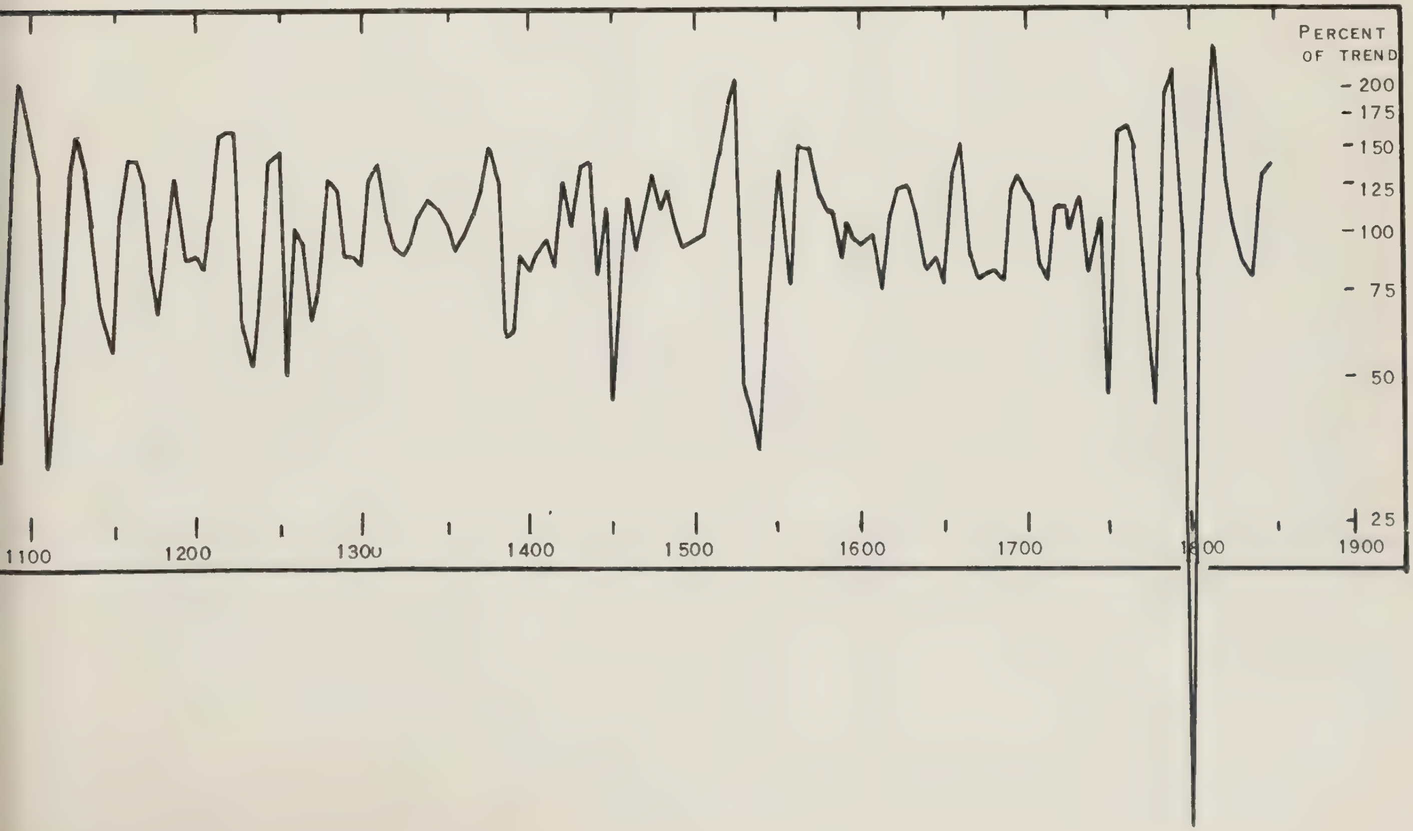


TABLE 4 RESULTS OF 37-YEAR PERIODIC TABLE

	1	2	3	4	5	6	7	7.4
I Av. $^{-3H}_{-3L}$	2.024	2.041	2.077	2.039	2.020	1.921	1.975	—
II Av. $^{-3H}_{-3L}$	[illegible]	2.018	2.044	2.079	2.066	2.055	2.082	—
III Av. $^{-3H}_{-3L}$	2.042	2.021	2.087	2.024	[illegible]	2.009	2.023	—
IV Av. $^{-3H}_{-3L}$	[illegible]	1.970	2.040	2.043	2.064	2.048	[illegible]	—

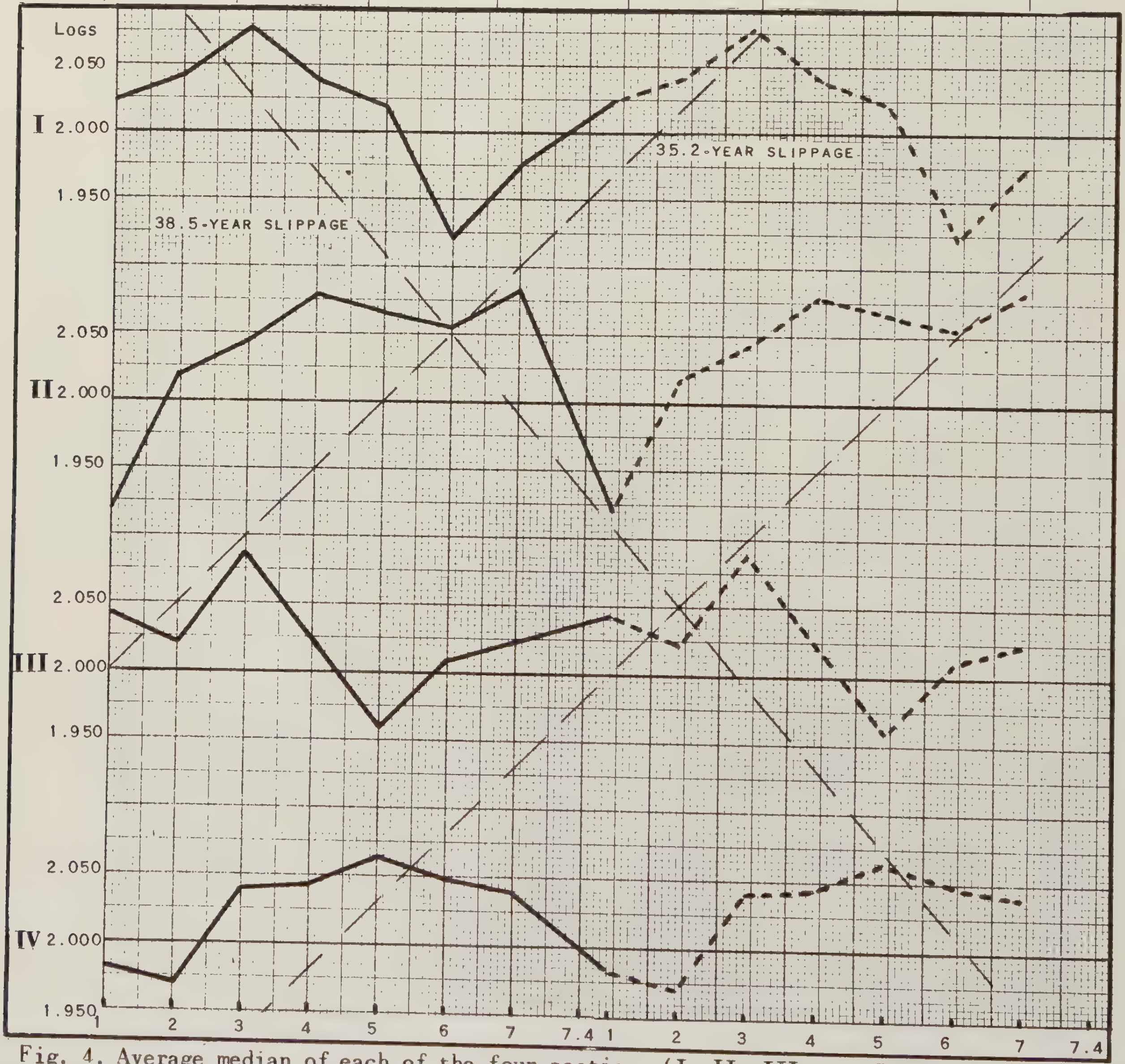


Fig. 4. Average median of each of the four sections (I, II, III, and IV) of the 37-year periodic table. Note the slippage to the left or right. If the slippage is to the left the indicated wave length is 35.2 years; if to the right the indicated wave length is 38.5 years.

sent.

To determine this we now construct two new periodic tables of our deviations, the one 7.04 and the other 7.71 items long. This time we averaged our periodic table by halves instead of by quarters, disregarding four highs and four lows in each column of each half.

Length Seen to be 35.2 Years

The results of this manipulation are shown in Charts 5 and 6. Chart 5 plots the average of the 7.04-item periodic table; Chart 6 plots the average of the 7.71-item periodic table. In Chart 5 we see that the waves in each of the two halves of the periodic table fall approximately under each other whereas in Chart 6 the wave, if any, in the second half is almost completely upside down in relation to the wave in the first half. It is therefore clear that the disturbances that made the waves in the four quarters of the 7.4-item periodic table slipped to the left and that the indicated cycle is 7.04 items or 35.2 years long.

The work was not done to make sure that the cycle of 35.2 years which is present on the average in each half of the series is truly rhythmic,--in other words, that it repeats itself time after time, but a Hoskins Time Chart of the original values indicated that it is, and this is very good evidence for preliminary purposes.

erd

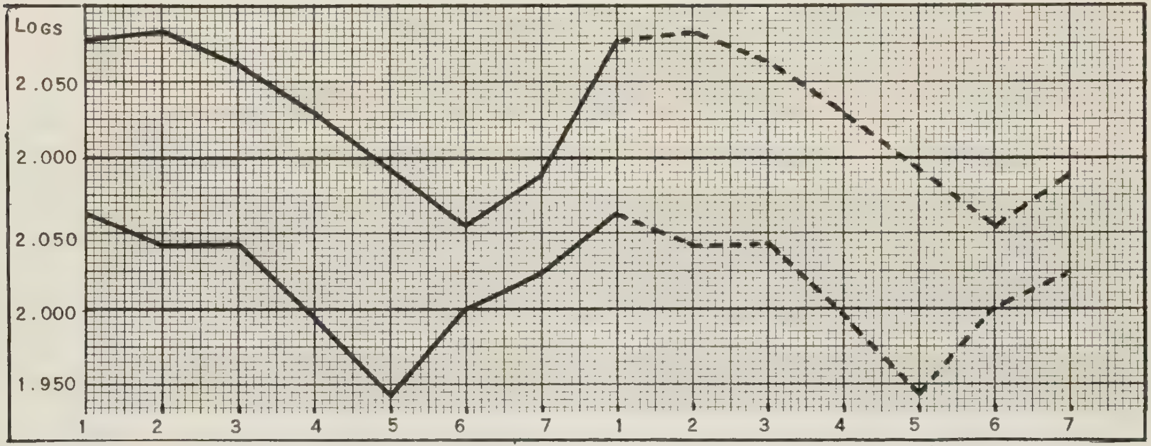


Fig. 5. Average median of each of the two halves of the 35.2-year periodic table. Note that the crests and troughs fall under each other. There is, on the average, a 35.2-year cycle in each half of the series of figures.

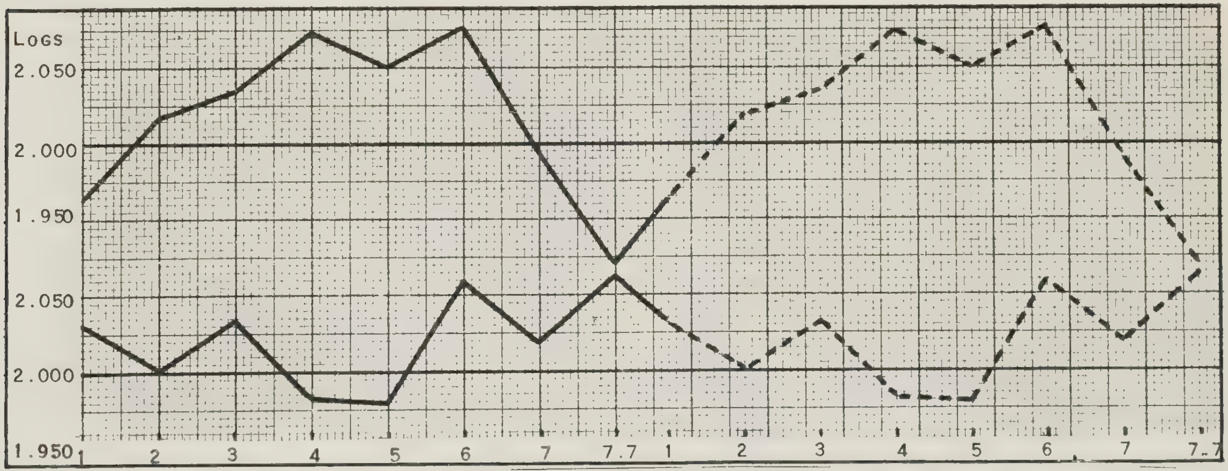


Fig. 6. Average median of each of the two halves of a 38.5-year periodic table. Wave of the second half does not fluctuate in phase with wave in the first half. Therefore there seems to be no 38.5-year cycle.

RAPID DECLINES AND SLOW ADVANCES

Dear Mr. Dewey:

If stock market price patterns are made up of regular or uniform sine curve cycles or rhythms, why do the curves go down faster in bear markets than up in bull markets? It takes probably twice as long for stock prices to go up as to go down. Why?

Very truly yours,
G. M. Sanborn

Northfield, Vermont.

Dear Mr. Sanborn:

There are many dramatic instances to substantiate the belief that stock prices go down faster in bear markets than they go up in bull markets.

On the other hand, there are equally dramatic instances to illustrate the contrary opinion. For example, there is no decline I know of comparable to the percentage advance that took place between March 1933 and July of that same year.

In this connection, you may wish to study industrial common stock prices 1871-1950 adjusted for trend as charted on pages 148 and 149 of our April 1951 report. I think you will agree with me that, taken over the whole stretch of 80 years, there is not too much evidence in support of the generally held idea that stock prices go down faster than they go up.

However, let us assume that the idea is right and that stock prices really do go down faster than they go up.

So what! There is no reason why regularly recurring cycles need be sine shaped. In fact, usually they are zigzag in shape.

Many Cycles Not Symmetrical

Also, there is no reason why they have to be symmetrical. In actual practice we find that many of them are not. As an illustration of this fact, look at the chart below showing the typical course of the four-year mouse cycle, or look at the charts showing the six-year cycle in 30 series of figures, as printed in our report for December 1950.

The six-year cycle in tree rings goes down slowly and up fast. In sunspots the curve goes down fast and up slowly. In the sales of Montgomery Ward and Company, and the Pittsburgh Plate Glass Company the typical six-year cycle goes down slowly and goes up fast. On the other hand, in the sales of Armour and Company, the ingot production of the Republic Steel Corporation, the dollar sales of the B. F. Goodrich Company, the gross operating revenue of Seaboard Airline, the gross operating revenue of Standard Oil Company of California, and the net sales of U.S. Rubber Company, the six-year cycle moves down fast and comes up slowly. In the other corporations and series studied the typical six-year cycle is symmetrical.

Combinations of Cycles

But suppose the cycles in the stock market really are sine shaped. A fast decline and a slow rise could easily be brought about by a combination of sine shaped cycles.

To illustrate this fact I am copying herewith some charts from **The Science of Musical Sounds** by Dayton C. Miller of the Case School of Applied Science in Cleveland.

These charts show how, if you wish, you could approximate a completely lopsided geometrical figure by combining sine curves.

The first curve shows, by means of a dotted line, the zigzag shaped pattern the author set out to reproduce, together with one single sine curve all by itself.

The next chart shows what happens when you add a second sine curve to the first one. The zigzag is more closely approximated.

The next four charts show the sum of three, four, and five sine curves respectively.

The sixth chart shows the combination of ten different sine waves. As you can see, by now the geometric form is almost completely reproduced.

The last curve shows the results obtained by combining 30 sine waves.

By adding more sine waves you can get closer and closer to the desired result.

Of course by combining the sine waves in a different way you could get a different shape, as is also illustrated. In fact, you can combine them in such a way as to reproduce any curve at all, as long as it progresses continuously from one side of the sheet to the other (curves that fold back on themselves cannot be reproduced by sine waves).

To sum the matter up, although stock prices often go down faster than they go up, they often go up faster than they go down. There does not seem to be any general rule that applies in all instances.

However, assuming that the stock market cycles really are lopsided, this could easily be their nature, unless they are sine curves.

If they are sine curves, they would have to be symmetrical unless there were several interacting sine curves present in the series of figures. In such a case the cycles could be consistently lopsided, going down fast and coming up slowly, or going down slowly and coming up fast, or unfolding in any other way, depending on how the cycles were related to each other in time span and timing.

If this letter does not make the matter entirely clear, I hope you will write to me again.

Cordially yours,

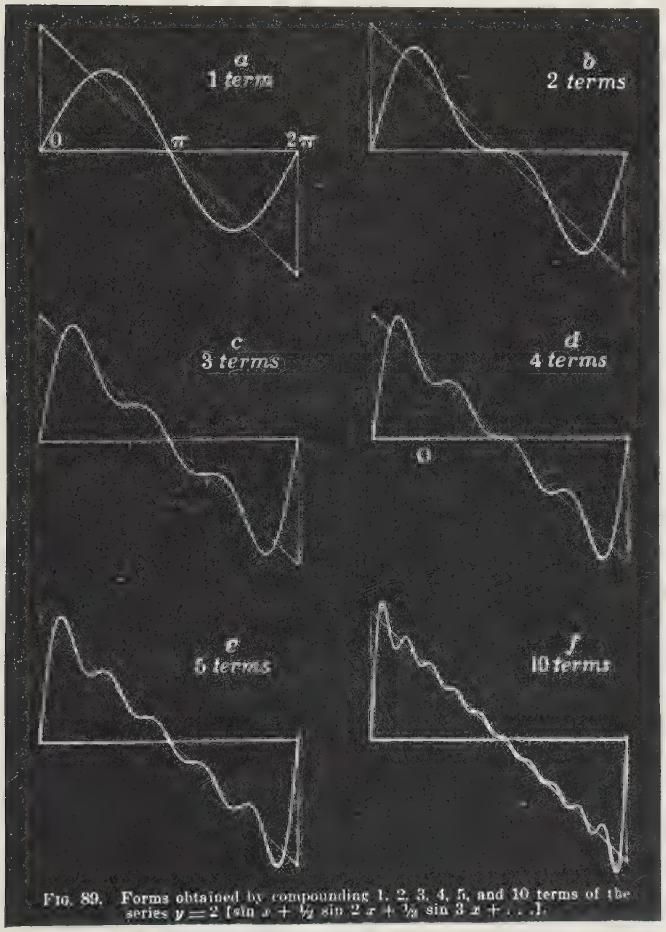


Fig. 89. Forms obtained by compounding 1, 2, 3, 4, 5, and 10 terms of the series $y = 2\,[\sin x + \frac{1}{2}\sin 2x + \frac{1}{3}\sin 3x + \ldots]$.

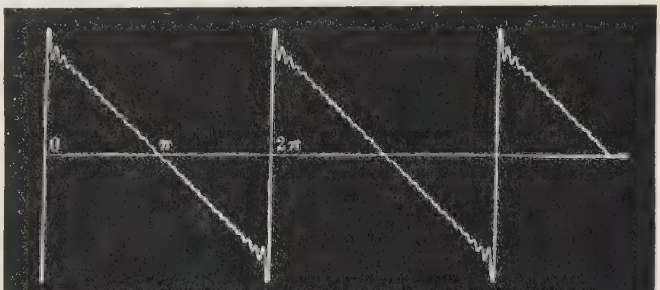


Fig. 90. Curve obtained by compounding 30 terms of the series $y = 2\,[\sin x + \frac{1}{2}\sin 2x + \frac{1}{3}\sin 3x + \ldots]$.

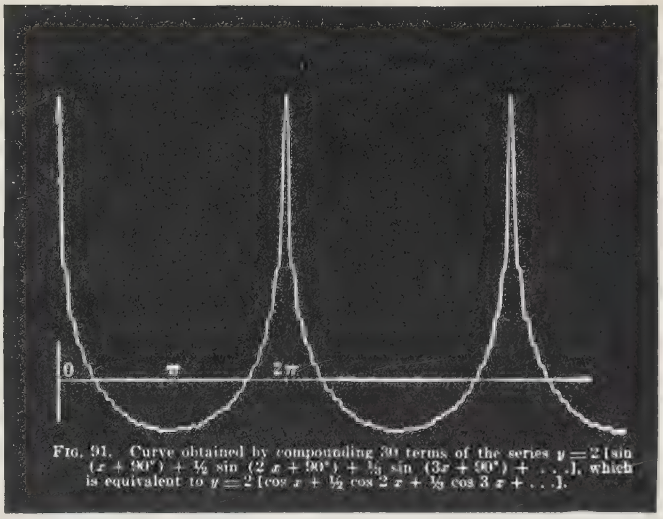


Fig. 91. Curve obtained by compounding 30 terms of the series $y = 2\,[\sin(x + 90^\circ) + \frac{1}{2}\sin(2x + 90^\circ) + \frac{1}{3}\sin(3x + 90^\circ) + \ldots]$, which is equivalent to $y = 2\,[\cos x + \frac{1}{2}\cos 2x + \frac{1}{3}\cos 3x + \ldots]$.

GLOSSARY WANTED

Dear Sirs:

As a new member, I have received my first two copies of **Cycles—A Monthly Report**. I find it a most fascinating study but am badly handicapped by lack of understanding certain expressions and methods...

Anthony Procker
Lombard, Illinois

In answer I wrote as follows:

Dear Mr. Procker:

I appreciate your postal card of June 25.

I think there should be a glossary at the back of each issue of our monthly report to explain all of the technical terms used in the report.

Until such time as I have time to prepare such a glossary I am going to try to build up our Question and Answer Department. I am turning over copies of the reports to a new secretary and will include in Questions and Answers an explanation of everything that she does not fully understand. I hope these answers will be helpful to many of our readers.

Many thanks to you for stimulating me to this action. If you do not object, I would like to print your letter and my reply if there is space in the next report.

Very cordially yours,

A QUICK TOOL WANTED

Dear Mr. Dewey:

I believe the Association should, as they do in mathematics, take some things as axiomatic:

a. That cycles exist.

b. That any cyclical phenomenon may be resolved into component parts, the simplest of which is the straight line, the most complex of which is a full circle.

I also feel that our present approach to the study of cycles is perhaps too limited and maybe too primitive.

Possibly we may find a more satisfactory approach from the field of geometry or analytic geometry, insofar as we try to study cycles as a **plane** phenomenon.

We might well take account of current and former attempts to hitch our wagons to the star of cycles and note the measures of success attained, the degrees of failure resulting and from that add to our philosophy as to the wrongness or rightness of our theories and hypotheses. Dozens of students or exponents of various ways of explaining (and extending) the cycle in various fields of human interest and activity are with us today—how objectively critical of their work and methods can we be?

Any cyclical move from low to high and back to next low (A^1=B-A^2) or corresponding moves may be regarded as the governing points for a circle. It would seem to me that the way the given move "fits" the circle might have indicative value of predictive nature, if properly understood and related to foregoing cyclical behavior and thus give us an improved "quick" tool for working with this data.

Sincerely yours,
Lewis M. Woodruff

Union Stockyards,
Peoria 2, Illinois.

Dear Mr. Woodruff:

I fully agree with you that cycles exist, but the rub in any given instance is whether or not they exist by accident or as a result of some basic cyclic force.

You are of course right that any cyclical phenomenon can be resolved into component parts but if the phenomenon resolved is the result of random forces the resolution is merely a mathematical exercise and is not going to do anyone any good.

The account of the way Benner's forecast worked out more or less fits into the idea of your fourth paragraph. I agree with you that more of this sort of thing should be done. Also I feel that a great deal should be done with controlled data—that is, series of figures made up by combining known cycles and accidental factors which one can then try to unscramble. Thanks again for your continued interest and your letter.

Very cordially yours,

AN OSWALD SPENGLER FOOTNOTE EXPANDED

Dear Sirs:

In case no better-qualified person follows up the suggestion of Gordon Adamson in the February issue of "Cycles," here is a brief report on 'Die Kriegs—und Geistesperioden im Volkerleben und Verkundigung des nachsten Weltkrieges" by Rudolf Mewes, first published in 1896, it is stated.

The New York Public Library has a copy of the second edition of this work, published in 1917 with some added material including a number of quotations from Kaiser William II. To judge by his other works in the Library catalogue, Rudolf Mewes, born in 1858, was or is a physicist of ability. His book on "War and Spiritual Periods in the Lives of Men and a Prediction of the next World War" he calls an astrological and psychological study. Cycles are extensively covered and the effect of sunspots is gone into. Some mathematics is introduced, but nothing more formidable than e with a negative exponent. As Spengler noted, the work is mystical, and many quotations from the Bible are introduced in the latter part. The following time-table is from the early part of the book:

A Time Table

1624-43 Time of the 30-years war
1654-82 Spinoza, Rembrandt, Locke, Hobbes, Age of Louis XIV
1682-1710 Turkish wars, following wars
1710-37 Science
1732-65 Frederick II, Silesian wars, etc.
1765-93 Second flowering of our literature
1793-1820 Napoleonic world war
1820-48 Art and Science
1848-76 The wars against Russia and Italy, and Germany against France
1876-1904 Art, science, and technics
1904-32 World war
1932-60 Peace, inner development
1960-88 War
1988-2016 Peace
2016-44 War
2044-72 Peace

The planetary gears appear to have slipped latterly.

Someone with more time and German would find the book well worth further study.

Yours faithfully,
(name withheld)

CYCLES IN GAMES

Dear Mr. Dewey:

A friend of mine who is in the wholesale business said that he did not welcome the day when yo-yos became a fad. He found it difficult to keep a supply large enough to meet the demand. Then one morning the demand would evaporate. He reported that this would come about as quickly and completely as turning off the electric lights in a room. His territory included a large section of a state.

I am interested in locating, if possible, the reason why the desire to buy yo-yos dries up all over a large area at the same time.

Have you any suggestions?

Sincerely yours,
J. Read Voigt

Dear Mr. Voigt:

I do not know why the desire to buy yo-yos vanishes over a wide area at the same time but, with you, I have the feeling that if we knew it might throw some light on the subject of cycles.

Buyers of tin tell me that reversal of attitude in regard to probable future tin prices occurs on the part of a variety of brokers for no apparent reason. Like you. they say this change comes about as if someone pulled an electric switch.

Perhaps someday we will know why these things occur but the best I can do now is to tell you that I have been told that popularity of particular kinds of games, puzzles, etc. recur at intervals of about 14 years. I, myself, can remember a craze for a similar toy called the diabalo in about 1907, which is three times fourteen years ago, but whether there was a similar craze about 1921 and about 1935 I do not know.

Cordially yours,

Questions and Answers

Q. What are the qualifications for scientific membership in the Foundation?

A. You must have published a scientific contribution to the fund of knowledge in respect to rhythmic cycles. Scientific members pay no dues. They get the Journal free but do not get the monthly reports unless they pay for them.

Q. What is the price of the **Journal of Cycle Research**?

A. It costs $1.25 a copy, $5.00 a year. It is issued quarterly.

Q. When was the Foundation for the Study of Cycles formed?

A. In 1940.

Q. Why don't you study weather cycles more?

A. They are too complicated. In the long run I think we will learn more about weather cycles by turning our backs upon them and studying simpler cycles first.

Q. What is a rhythmic cycle?

A. A rhythm. A cycle which repeats with rhythm or beat. That is, a cycle which repeats with reasonable regularity. A cycle which repeats with perfect regularity is called a periodicity.

Q. What is a Hoskins Time Chart?

A. It is a diagram on which you record objectively determined highs and lows so as to see the extent to which the cycle is rhythmic. It is described fully in the Foundation's **Technical Bulletin Number 3.**

Q. What is a "running average?"

A. It is the same as a moving average. A moving average is sometimes called a moving mean, too.

Q. Why do you plot the moving average values at the middle position? Why don't you plot them at the latest position and have them up to date?

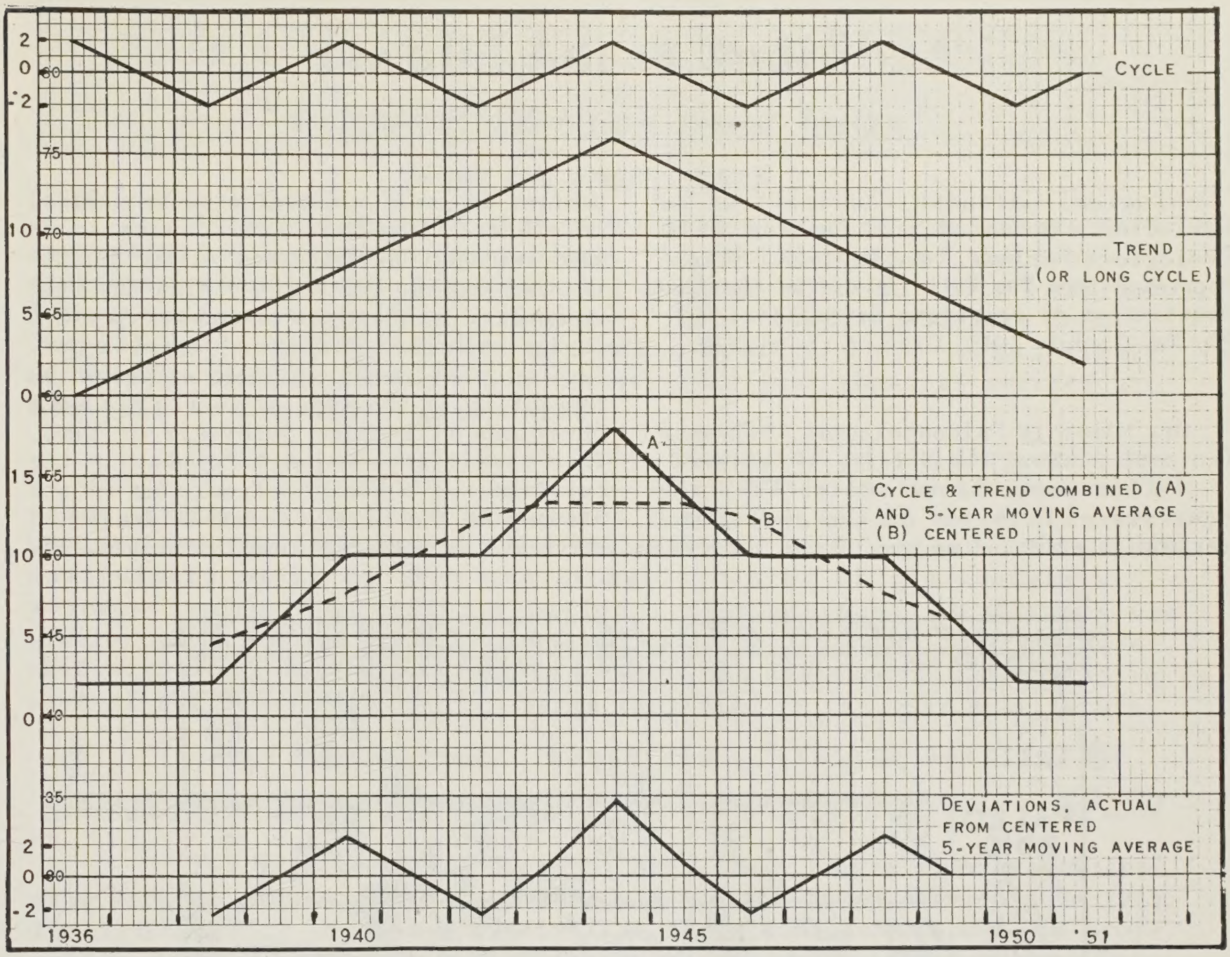
A. You can plot moving averages at the latest position but it does not do you any good and it gets you into trouble as you continue your work.

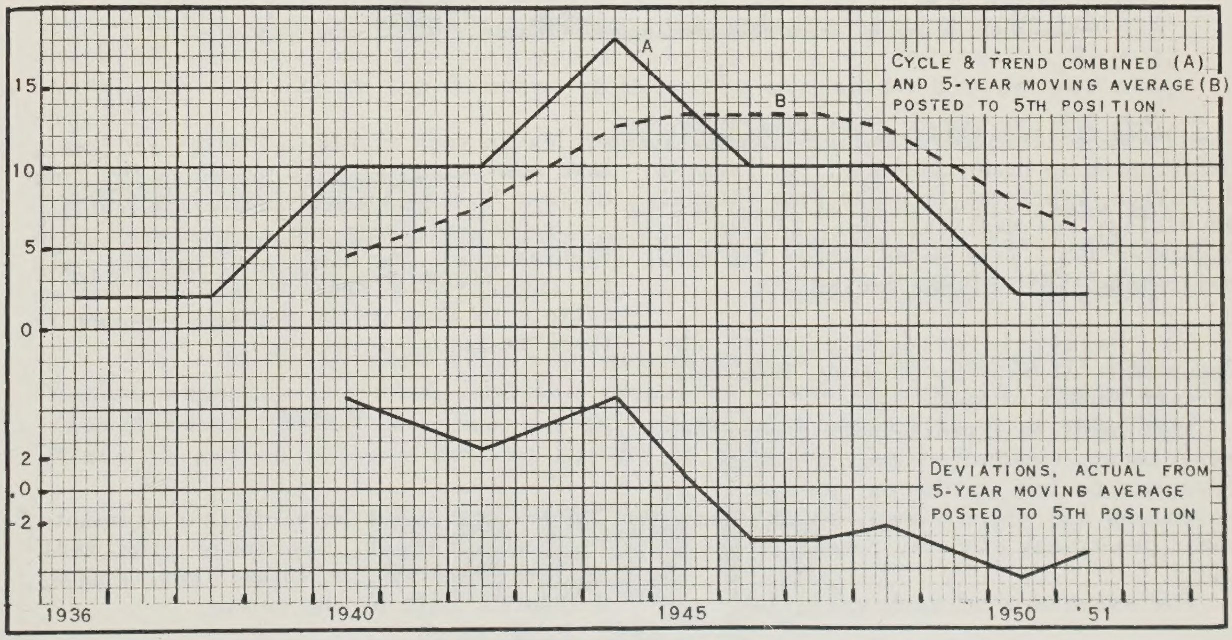
Suppose you average prices for the five years 1947, 1948, 1949, 1950, and 1951. Having gotten this figure you can plot it at 1947, calling it the average price for the five years starting in '47. Or you can plot it in 1949, calling it the average price for the five years centering in '49. Or, for that matter, you can plot it in 1951, calling it the average price for the five years ending in '51. You are just fooling yourself if you think that it is any more up to date to call it the average for the five years ending in 1951. In any event, the average figure is the same.

If you are dealing with just one moving average the plotting off center isn't so bad, but if you wish to compare one moving average with another, or the original figures with the moving average, it creates distortions unless all the averages are centered.

For example:

	A	B	C	D	E	F	G
YEAR	4-YEAR CYCLE	TREND	SUM OF CYCLE & TREND	5-YEAR MOVING AVERAGE CENTERED	DIFFERENCE BETWEEN SUM OF CYCLE & TREND (C) AND 5-YEAR M.AV. CENTERED (D)	5-YEAR MOV. AV POSTED TO 5TH POSITION	DIFFERENCE BETWEEN SUM OF CYCLE & TREND (C) AND 5-YEAR M. AV. POSTED TO 5TH POSITION (F)
1936	2	0	2				
1937	0	2	2				
1938	-2	4	2	4.4	-2.4		
1939	0	6	6	6.0	0		
1940	2	8	10	7.6	2.4	4.4	5.6
1941	0	10	10	10.0	0	6.0	4.0
1942	-2	12	10	12.4	-2.4	7.6	2.4
1943	0	14	14	13.2	.8	10.0	4.0
1944	2	16	18	13.2	4.8	12.4	5.6
1945	0	14	14	13.2	.8	13.2	.8
1946	-2	12	10	12.4	-2.4	13.2	-3.2
1947	0	10	10	10.0	0	13.2	-3.2
1948	2	8	10	7.6	2.4	12.4	-2.4
1949	0	6	6	6.0	0	10.0	-4.0
1950	-2	4	2			7.6	-5.6
1951	0	2	2			6.0	-4.0


2
0
-2
60
75
10
70
5
65
0
60
15
55
10
50
5
45
0
40
35
2
0
30
-2
CYCLE
TREND
(OR LONG CYCLE)
A
B
CYCLE & TREND COMBINED (A)
AND 5-YEAR MOVING AVERAGE
(B) CENTERED
DEVIATIONS, ACTUAL
FROM CENTERED
5-YEAR MOVING AVERAGE
1936
1940
1945
1950
'51

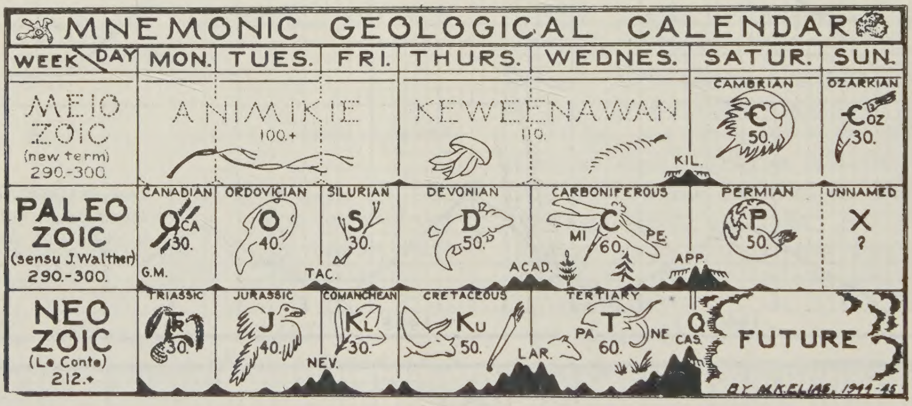

15
10
5
0
2
0
-2
A
B
CYCLE & TREND COMBINED (A)
AND 5-YEAR MOVING AVERAGE (B)
POSTED TO 5TH POSITION.
DEVIATIONS, ACTUAL FROM
5-YEAR MOVING AVERAGE
POSTED TO 5TH POSITION
1936
1940
1945
1950
'51

Additions to the Library

"Geological Calendar--Indications of Periodicity in Nature and Succession of Geological Periods," by Maxim K. Elias. Reprinted from **The Bulletin of the American Association of Petroleum Geologists**, Vol. 29, No. 7, July 1945. Gift of the author.

Dr. Elias is Paleontologist, Nebraska Geological Survey, University of Nebraska.

In his paper Elias states "The inequality of duration of the geological periods is accepted as one of the most important and well substantiated geological inferences. However, there seems to be good evidence, as discussed in the following paragraphs, for a conclusion that the inequality in the duration of the periods is not haphazard but has a definite pattern or orderliness, which is expressed in repetition of the same or nearly the same durations at regular intervals of time. This orderliness seems to emphasize the existence of a grand periodicity in the history of the earth, possible causes of which are as yet only dimly perceived..."



* * *

"Daily Variations of Standing Potential Differences in Human Subjects," by Leonard J. Ravitz, reprinted from **The Yale Journal of Biology and Medicine**, Vol. 24, No. 1, September 1951. Four pages, three figures, references. Gift of Dr. Ravitz.

Dr. Ravitz is associated with the Department of Neuropsychiatry, Duke University School of Medicine.

This paper is a preliminary report upon experiments conducted over a period of from two to ten months on ten subjects, seven men and three women, to determine their day-to-day electric potential variation.

The existence of such variation, and cycles in such figures at least in trees, have been experimentally proved by Dr. Burr of Yale (see our report for November 1950).

Dr. Ravitz finds cycles present in his figures also. The results of his work are so interesting that I am devoting an article to them in the September report, if there is space.

* * *

" A New Device for Sampling Lake Sediments," by Ira T. Wilson, Reprinted from **Sedimentary Petrology** for August 1941. 7 pages, 4 figures. Gift of the author.

Announcing the New Predix Plate II . . .

CYCLICAL ANALYSIS

Industrial Common Stock Index

BASED ON WEEKLY DATA

This is the Chart that purchasers of Plates 1 & 1A have been requesting us to develop and publish. It includes all of the cyclical components that intensive analysis has enabled us to isolate and project into future months to form a forecast. Over thirty components in all, ranging in length from fifty odd years down to a few weeks. Their synthesis, plus long term trend, constitutes just about as refined an analysis as possible, cycle-wise.

Plate 11 is 22 x 32, in three colors, on weekly time rulings. It charts the weekly closing prices of the Industrials for the past eight years together with the synthesis of trend and all of the cycle components for the same dates. The synthesis is then projected thru the next eighty weeks to show the probable course of the industrial average during this critical period. Past goodness of fit and the growing authority of cycle theory lead us to feel certain that the forecast will be of very real value to traders and investors. Especially in view of the substantial market moves indicated in the very near future.

➧ RELEASED MAY 20 * ORDER NOW * LIMITED PRINTING ⬅

EIGHTEEN MONTH FORECAST – PLATE II $7.50

You have doubtless heard of our Plates 1 & 1A with twenty four page booklet showing the Industrial Common Stock Index from 1854 to 1951, the synthesis of trend and twenty five cycle components, and the projection of the synthesis thru 1962 to form a ten year forecast. This long range analysis and forecast provides an ideal background against which to appraise and evaluate short range plans and forecasts. 22 x 32 Chart, 11 x 17 Chart and booklet originally priced at $10.00 per set, recently ***REDUCED TO ONLY $5.00***

SPECIAL OFFER! If you wish to place your order now for BOTH SETS of charts and accompanying data you may take advantage of this special group price and ***SEND ONLY $10.00***

We think this is a very modest charge for the amount of published material included, and the amount of research work and computational labor behind it. The 1 & 1A set will be mailed at once and the Plate 11 set on release date of May 20 or before.

PREDIX

P. O. BOX 1245 DEPT. F
CORAL GABLES, FLA.

Mr. H. A. Musham
741 No. Rush St.
Chicago, Ill.

March
#3011

FELLOWSHIP AVAILABLE!

The Foundation announces the creation of three Fellowships, each to run for three years. These Fellowships were created to enable qualified students to spend full time at Foundation headquarters in the study of the subject of cycles.

One of these Fellowships has already been financed. The problem now is to find a suitable Fellow. Are you interested or do you know of anyone who might be interested?

The Fellow will live, rent free, in an 8-room house adjacent to research headquarters of the Foundation at East Brady, Pennsylvania, and will receive a stipend adequate for the support of himself and his family. If you are interested, write to the Director of the Foundation, giving your qualifications and the amount of money that you would require.

If you are not interested yourself, please try to get some other qualified person to make an application.

Foundation for the Study of Cycles
Research Headquarters
East Brady, Pennsylvania

P. S. Would you like to pledge $35. a year for three years toward the financing of the second Fellowship?